

# AKAI SERVICE MANUAL



VIDEO CASSETTE RECORDER

MODEL VS-5EG/EK



## VIDEO CASSETTE RECORDER

MODEL **VS-5EG/EK**

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# I. SPECIFICATIONS

|                        |                    |                                                                                                                                                  |
|------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| FORMAT                 |                    | VHS PAL Standard                                                                                                                                 |
| VIDEO RECORDING SYSTEM |                    | Rotary, slant azimuth two-head helical scan system                                                                                               |
| VIDEO SIGNAL SYSTEM    |                    | PAL colour and CCIR monochrome signals, 625 lines                                                                                                |
| TAPE WIDTH             |                    | 12.7 mm                                                                                                                                          |
| TAPE SPEED             | NORMAL             | 23.39 mm/sec                                                                                                                                     |
|                        | FF/REW             | 4 min. (AKAI E-240 cassette)                                                                                                                     |
|                        | QUICK FINDER       | Approx. 9 times normal speed                                                                                                                     |
| RECORDING SPEED        |                    | 240 min. (AKAI E-240 cassette)                                                                                                                   |
| POWER REQUIREMENTS     |                    | 220V/110V (VS-5EG), 200V/240V (VS-5EK)<br>AC selectable, 50 Hz 37 Watts (Including video timer)                                                  |
| OPERATING TEMPERATURE  |                    | 5°C to 40°C                                                                                                                                      |
| AERIAL INPUT           | VS-5EG             | VHF Band I, Channels 2 to 4,<br>VHF Band III, Channels 5 to 12,<br>UHF Band IV/V, Channels 21 to 69                                              |
|                        | VS-5EK             | UHF Band IV/V, Channels 21 to 69 only                                                                                                            |
| AERIAL OUTPUT          |                    | UHF Channels 30 to 39 (adjustable)<br>Set to channel 36 prior to shipment                                                                        |
| VIDEO SIGNAL           | INPUT              | 0.5 to 2.0 Vp-p/75 ohms (video/sync ratio should be normal)                                                                                      |
|                        | OUTPUT             | 1.0 Vp-p/75 ohms                                                                                                                                 |
|                        | S/N                | More than 43 dB                                                                                                                                  |
| HORIZONTAL RESOLUTION  |                    | More than 240 lines                                                                                                                              |
| AUDIO SIGNAL INPUT     | MIC                | -70 dBs/high impedance unbalanced                                                                                                                |
|                        | LINE               | -20 dBs/50 kohms unbalanced                                                                                                                      |
| AUDIO SIGNAL OUTPUT    |                    | -6 dBs/less than 1 kohm unbalanced                                                                                                               |
| S/N                    |                    | More than 40 dB                                                                                                                                  |
| FREQUENCY RESPONSE     |                    | 70 Hz to 8 kHz                                                                                                                                   |
| VIDEO TIMER            | CLOCK DISPLAY      | 24 hour fluorescent digital display                                                                                                              |
|                        | CLOCK REFERENCE    | Locked to power line frequency, 50/60 Hz self select                                                                                             |
|                        | NUMBER OF PROGRAMS | 9 programs possible:<br>Five 14 days one time memory programs<br>Two every day programs<br>Two every week programs<br>Sleeper operation possible |
| DIMENSIONS             |                    | 440(W) × 133(H) × 398(D) mm (17.3 × 5.2 × 15.7 inches)                                                                                           |
| WEIGHT                 |                    | 12 kg (26.4 lbs)                                                                                                                                 |

\* For improvement purposes, design and specifications are subject to change without notice.

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## SECTION 1

# SERVICE MANUAL

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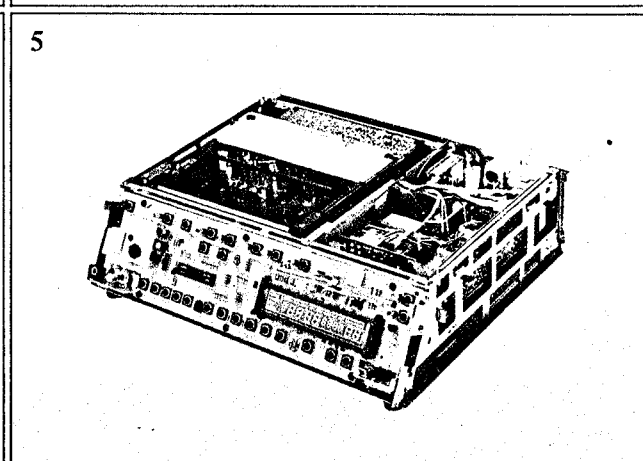
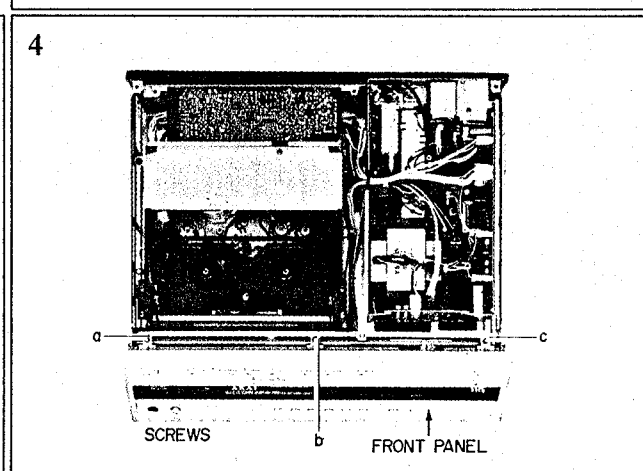
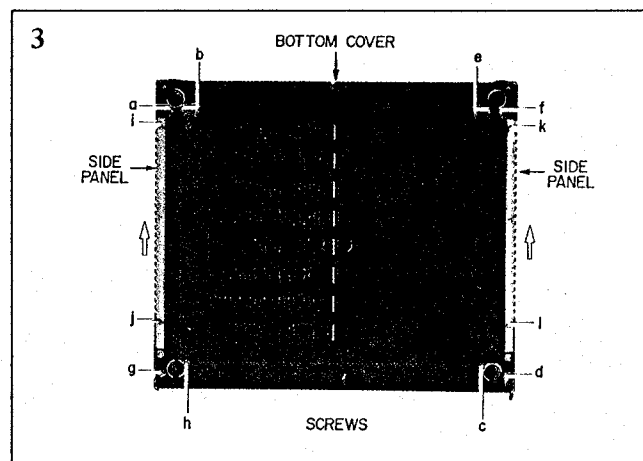
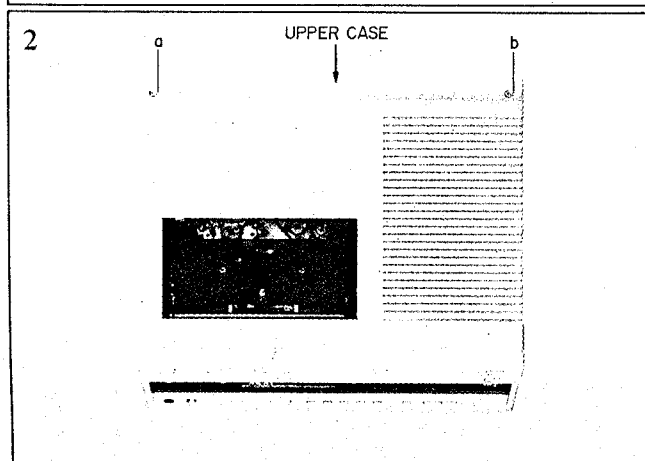
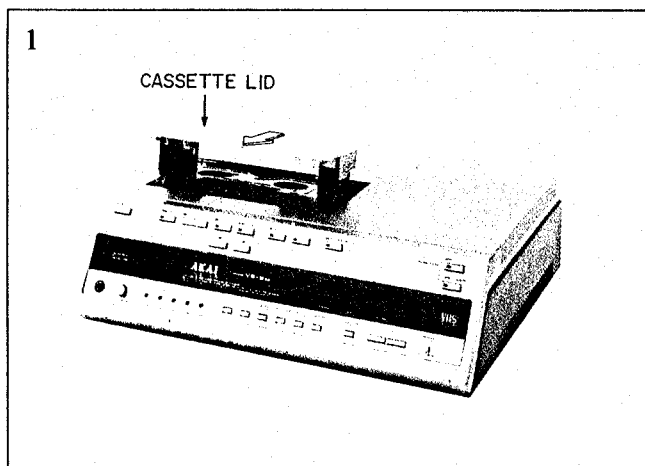
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## II. DISMANTLING OF UNIT

In case of trouble, etc. necessitating dismantling, please dismantle in the order shown in the photographs. Reassemble in reverse order.



### III. CONTROLS

#### 1. VS-5EG/EK

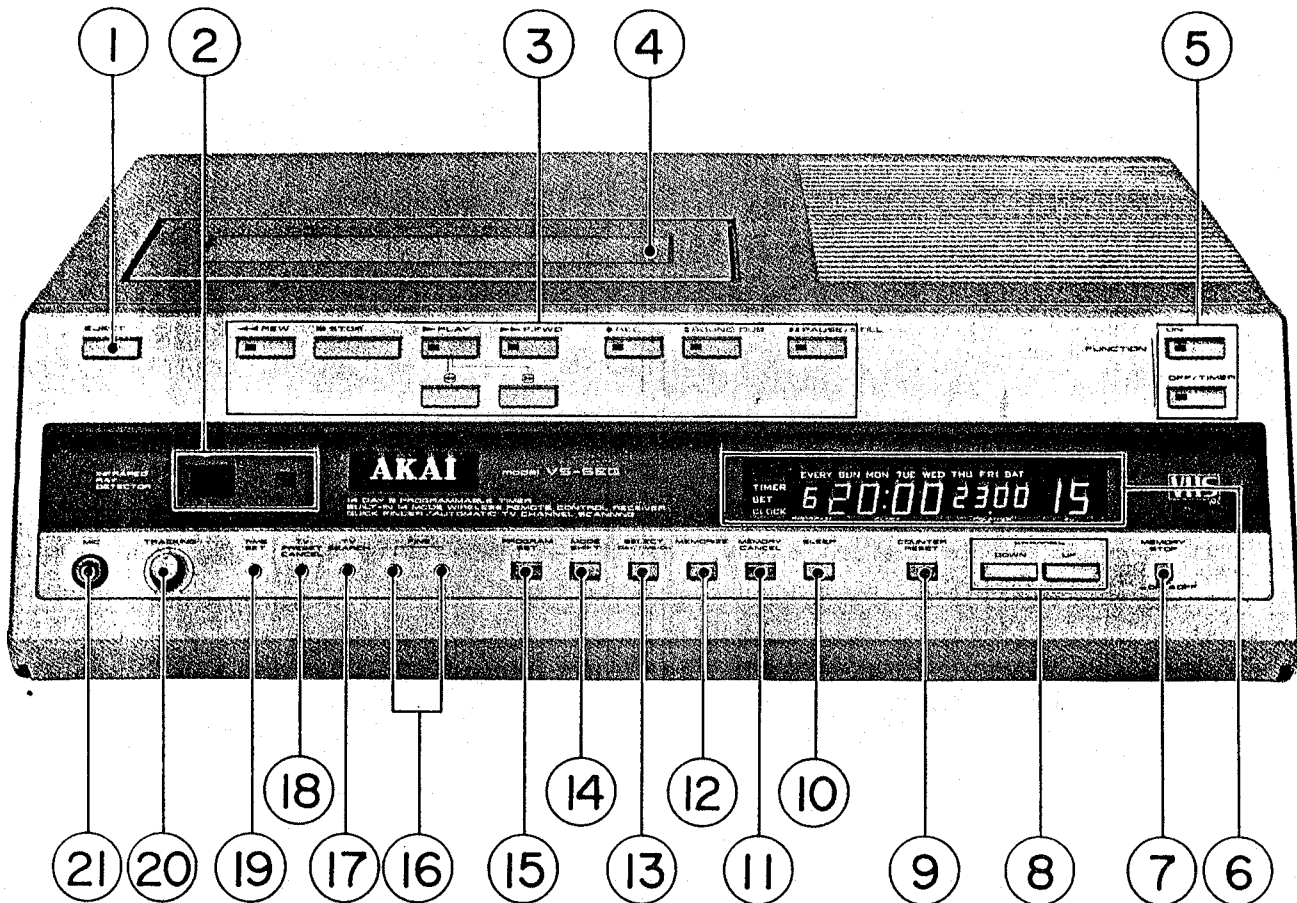


Fig. 1

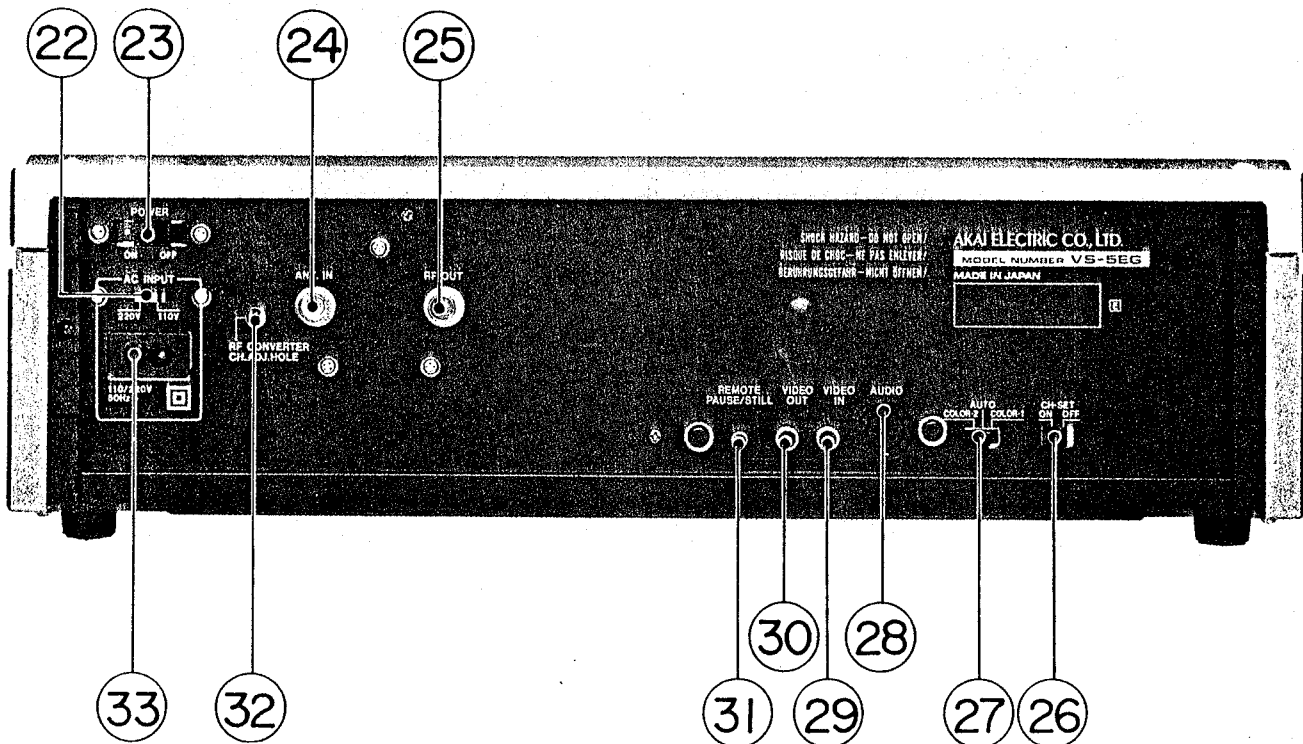


Fig. 2

## 2. REMOTE CONTROL UNIT RC-V5

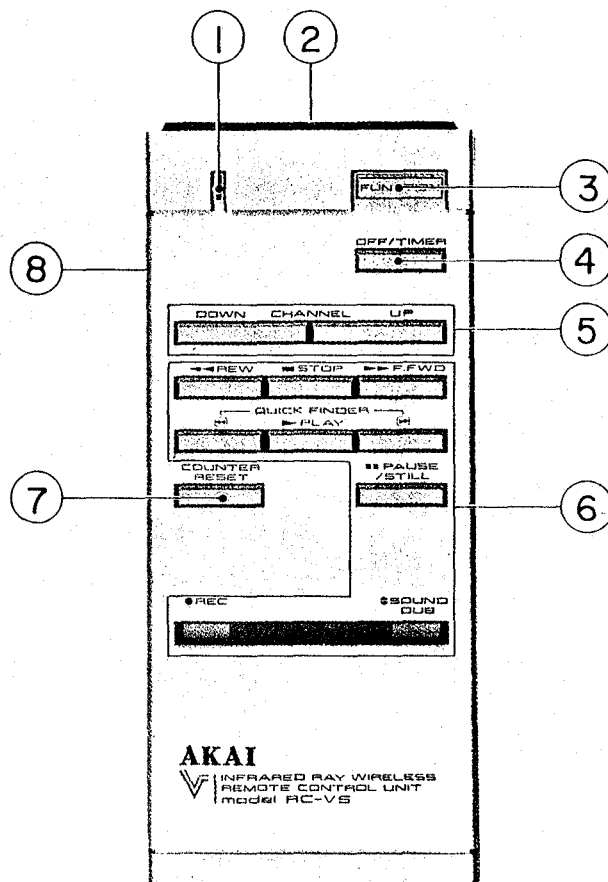


**Fig. 3**

1. EJECT BUTTON
2. INFRARED RAY DETECTOR and  
REMOTE CONTROL INDICATOR
3. OPERATING BUTTONS
4. CASSETTE HOLDER
5. FUNCTION BUTTONS (ON and OFF/TIMER)
6. DIGITAL DISPLAY (PROGRAM, CLOCK/START TIME,  
COUNTER/STOP TIMER and TV CHANNEL)
7. MEMORY STOP SWITCH
8. CHANNEL BUTTONS
9. COUNTER RESET BUTTON
10. SLEEP BUTTON
11. MEMORY CANCEL BUTTON
12. MEMORIZE BUTTON
13. SELECT DAY/TIME/CHANNEL (CH) BUTTON
14. MODE SHIFT BUTTON
15. PROGRAM SET BUTTON
16. FINE TUNING HOLES
17. TV SEARCH HOLE
18. TV PRESET CANCEL HOLE
19. TIME SET HOLE
20. TRACKING CONTROL
21. MICROPHONE (MIC) JACK
22. AC INPUT SELECTOR
23. POWER SWITCH
24. ANTENNA (ANT.) IN JACK
25. RF. OUT JACK
26. CHANNEL (CH.) SET SWITCH
27. VIDEO MODE SELECTOR
28. AUDIO JACK
29. VIDEO IN JACK
30. VIDEO OUT JACK
31. REMOTE PAUSE/STILL JACK
32. RF CONVERTER CHANNEL (CH.)  
ADJUSTMENT (ADJ.) HOLE
33. AC INLET

1. REMOTE CONTROL INDICATOR
2. TRANSMITTING WINDOW
3. FUNCTION BUTTON
4. OFF/TIMER BUTTON
5. CHANNEL BUTTONS
6. OPERATING BUTTONS
7. COUNTER RESET BUTTON
8. SAFETY LOCK

## IV. PRINCIPAL PARTS LOCATION

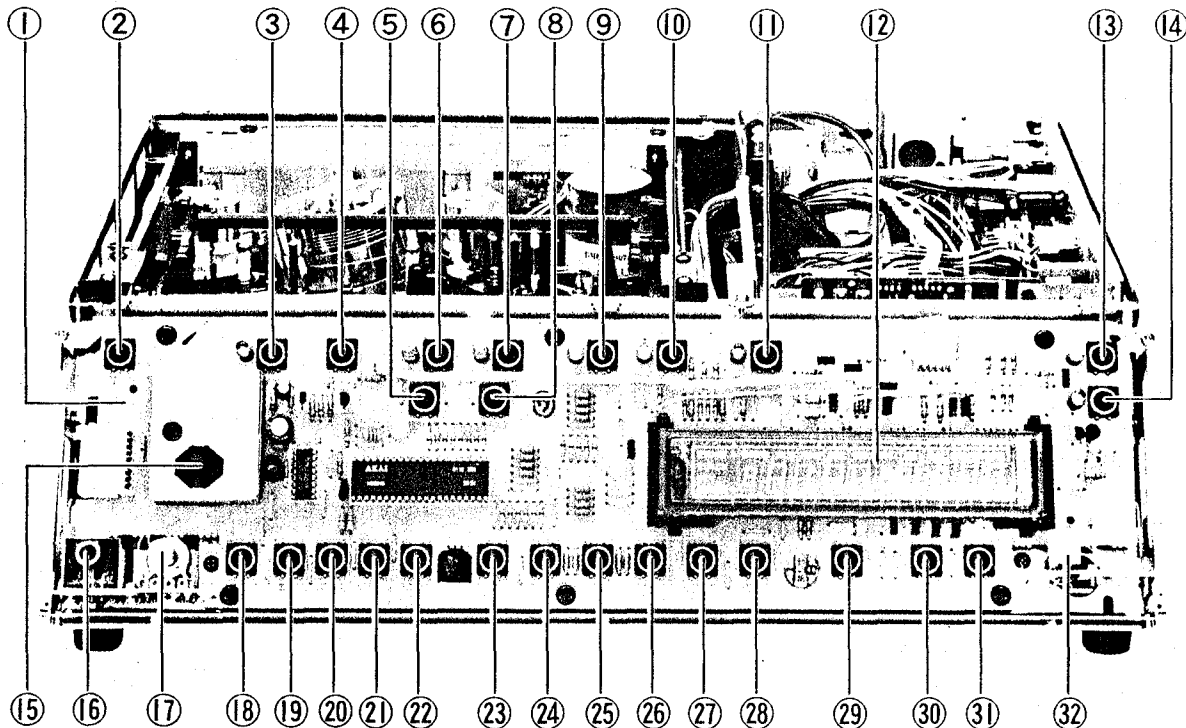


Fig. 4 Front View

- |                                 |                                    |
|---------------------------------|------------------------------------|
| 1. DISPLAY P.C BOARD V1004A5440 | 17. TRACKING VOLUME                |
| 2. EJECT SWITCH                 | 18. TIMER SET SWITCH               |
| 3. REW SWITCH                   | 19. TV PRESET CANCEL SWITCH        |
| 4. STOP SWITCH                  | 20. TV SEARCH SWITCH               |
| 5. QUICK FINDER ( ◀ ) SWITCH    | 21. FINE TUNING SWITCH (+)         |
| 6. PLAY SWITCH                  | 22. FINE TUNING SWITCH (-)         |
| 7. F.FWD SWITCH                 | 23. PROGRAM SET SWITCH             |
| 8. QUICK FINDER ( ▶ ) SWITCH    | 24. MODE SHIFT SWITCH              |
| 9. REC SWITCH                   | 25. SELECT DAY/TIME/CHANNEL SWITCH |
| 10. SOUND DUB SWITCH            | 26. MEMORIZE SWITCH                |
| 11. PAUSE/STILL SWITCH          | 27. MEMORY CANCEL SWITCH           |
| 12. DIGITAL DISPLAY             | 28. SLEEP SWITCH                   |
| 13. FUNCTION ON SWITCH          | 29. COUNTER RESET SWITCH           |
| 14. FUNCTION OFF/TIMER SWITCH   | 30. CHANNEL SWITCH (DOWN)          |
| 15. INFRARED RAY DETECTOR       | 31. CHANNEL SWITCH (UP)            |
| 16. MIC JACK                    | 32. MEMORY STOP SWITCH             |



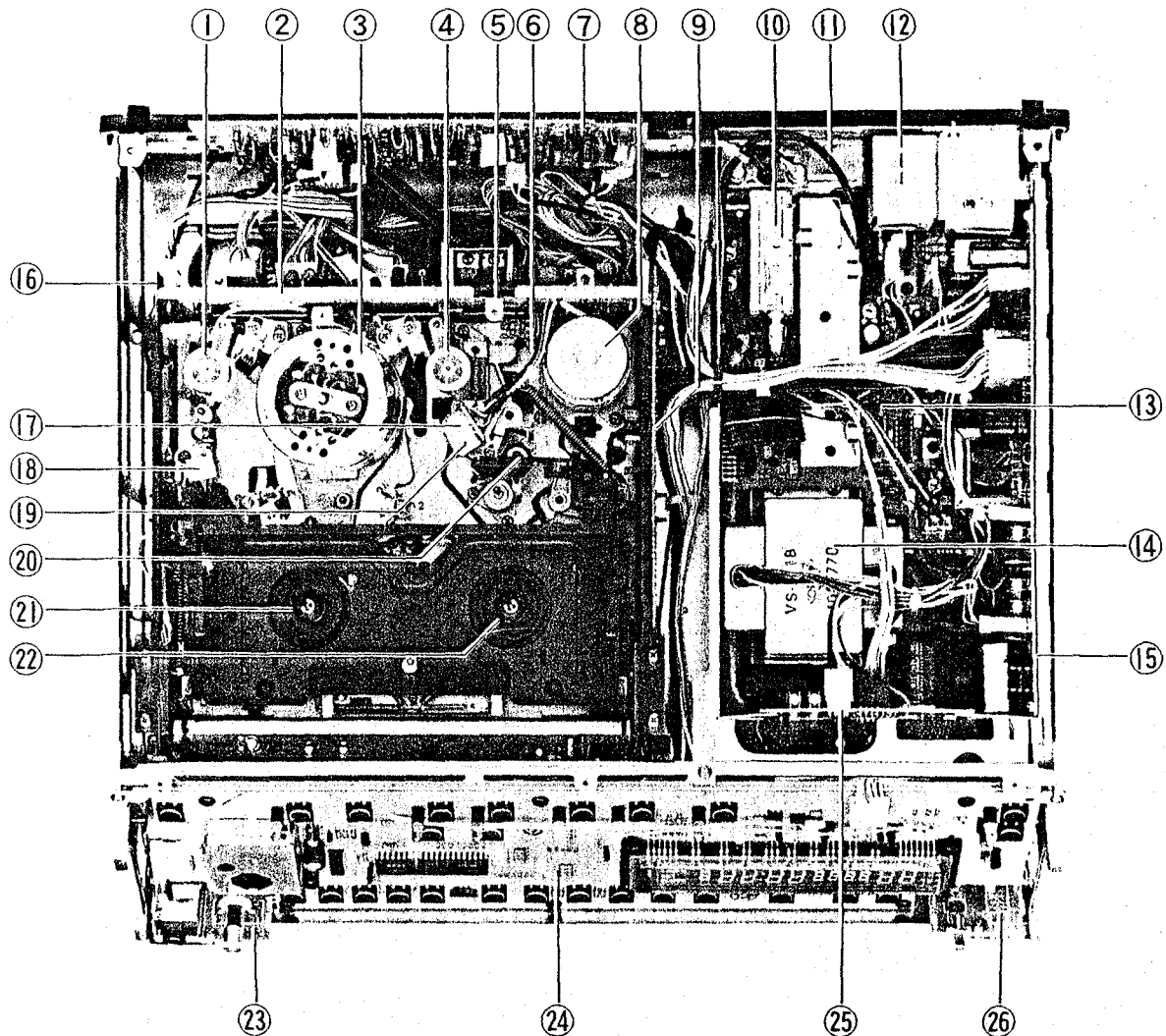


Fig. 5 Top View

- |                                       |                                     |
|---------------------------------------|-------------------------------------|
| 1. S. IMPEDANCE ROLLER                | 14. POWER TRANS                     |
| 2. DRUM MOTOR P.C BOARD V1004B5490    | 15. POWER SUPPLY P.C BOARD KA240178 |
| 3. DRUM HEAD BLOCK                    | 16. SENSOR P.C BOARD V1004C5370     |
| 4. T.U IMPEDANCE ROLLER               | 17. AUDIO ERASE HEAD                |
| 5. CAPSTAN MOTOR P.C BOARD V1004B5491 | 18. FULL ERASE HEAD                 |
| 6. C.M FILTER P.C BOARD V1004D5500    | 19. AUDIO/CONTROL HEAD              |
| 7. AUDIO P.C BOARD V1004A5350         | 20. PINCH ROLLER                    |
| 8. CAPSTAN MOTOR                      | 21. SUPPLY REEL                     |
| 9. DRIVE P.C BOARD V1004B5360         | 22. TAKE UP REEL                    |
| 10. TUNER UNIT                        | 23. MIC P.C BOARD V1004C5380        |
| 11. ANTENNA BOOSTER                   | 24. DISPLAY P.C BOARD V1004A5440    |
| 12. RF CONVERTER                      | 25. POWER SUB P.C BOARD             |
| 13. TUNER P.C BOARD KB240303          | 26. MEMORY P.C BOARD V1004C5381     |

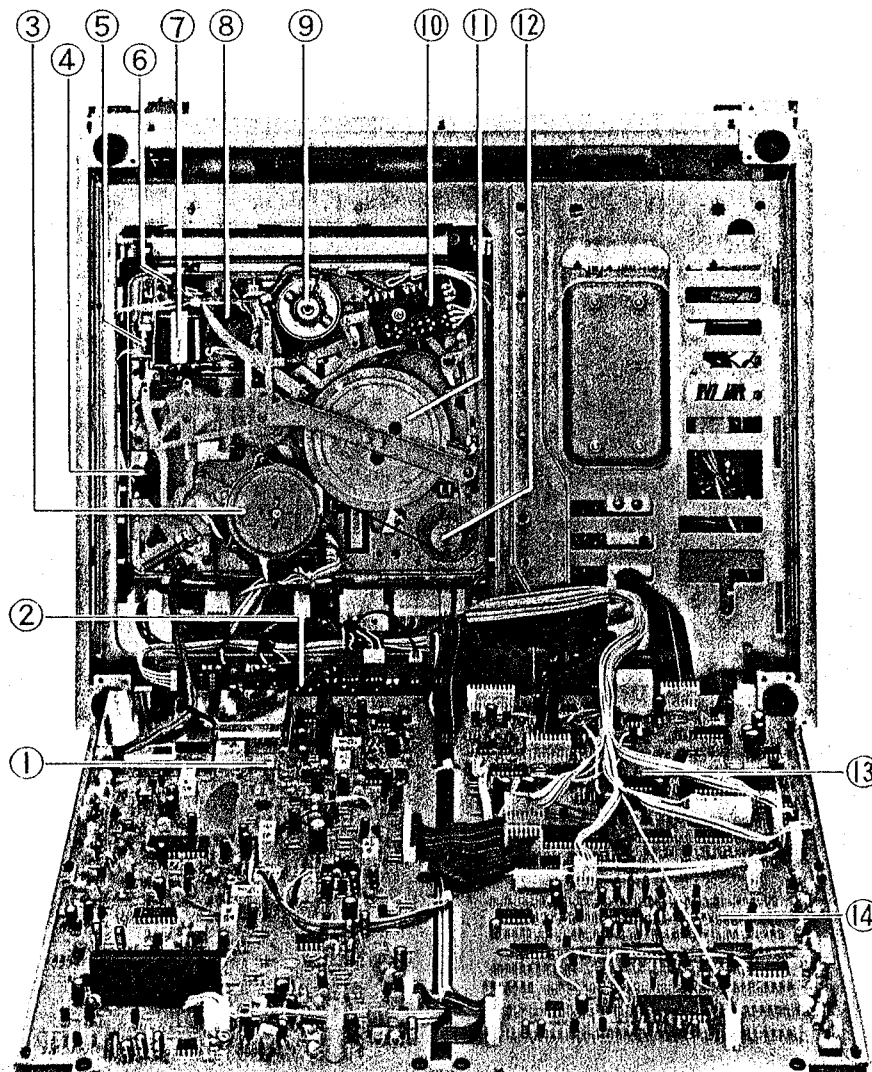


Fig. 6 Bottom View

- |                               |                                       |
|-------------------------------|---------------------------------------|
| 1. VIDEO P.C BOARD V1004A5420 | 8. LOADING SWITCH B                   |
| 2. REAR P.C BOARD V1004C5390  | 9. REEL MOTOR                         |
| 3. DRUM MOTOR                 | 10. MOTOR FILTER P.C BOARD V1004D5400 |
| 4. LOADING SWITCH A           | 11. CAPSTAN FLYWHEEL                  |
| 5. EJECT SWITCH               | 12. CAPSTAN MOTOR                     |
| 6. REC SAFETY SWITCH          | 13. SYSCON P.C BOARD V1004A5341       |
| 7. LOADING MOTOR              | 14. SERVO P.C BOARD V1004A5340        |

## V. VOLTAGE CONVERSION

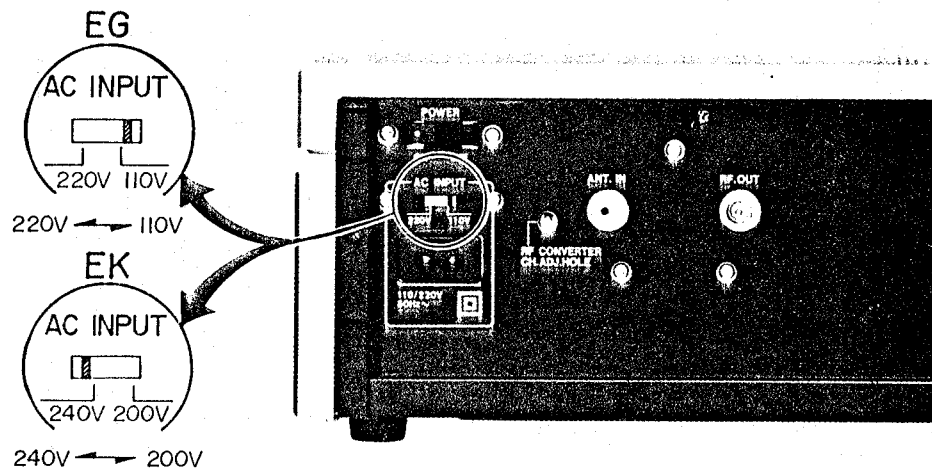


Fig. 7

Power requirements for electrical equipment differ from area to area. The operating voltage of VS-5 is preset to 220V (VS-5EG) or 240V (VS-5EK). Before connecting, check that the AC INPUT selector on the rear panel is set to the voltage for your area:

220V, 50 Hz for Europe except UK

240V, 50 Hz for UK

110V, 200V, 220V or 240V, 50 or 60 Hz for other countries. (If in doubt, consult a qualified electrician.)

If the AC INPUT is not set for your area:

1. Confirm that the POWER Switch on the rear panel is set to OFF.
2. Confirm that the POWER Cord is disconnected.
3. Move the AC INPUT selector with a screwdriver so that the marker is above the voltage for your area.

## VI. CIRCUIT DESCRIPTION

### 1. MAIN FEATURES OF VS-5

Main features of VS-5 are as follows.

#### 1-1. Buzzer Alarm

In any one of the following cases, the built-in buzzer issues a warning.

##### 1) Tape End

When the clear tapes attached to the starting end and finishing end of the tape pass in front of the sensor in any mode.

##### 2) Counter "0000"

When the counter passes "0000" in FF or REW.

##### 3) Rec. Safety

Rec button or sound dub button is pressed when using the tape whose erasure prevention tab is snapped off.

##### 4) Break-down

When break-down occurs in VS-5 for some reasons, the break-down is indicated and the power supply is cut off.

#### 1-2. Quick Finder

- Noise-less playback of 9 time speed (normal and reverse direction) is possible, and since the noise bar is only produced in the fixed position, the picture does not flicker and it is easy to see.

#### 1-3. STILL, Frame Advance, Slow Motion, Playback

##### 1) STILL

Still picture can be obtained by pressing the PAUSE/STILL button while playing.

##### 2) Frame Advance

One frame can be advanced each time the PAUSE/STILL button is pressed while playing.

##### 3) Slow Motion

Slow motion playback is possible by pressing continuously the PAUSE/STILL button for more than 0.5 seconds.

It should be noted that if the still mode is kept for more than 90 seconds, it will be automatically changed to the stop mode to protect the tape.

#### 1-4. Auto Tuning Synthesizer Tuner

By pressing the TV Search button, the TV signal is automatically caught and the scanning is automatically stopped at the best point.

If the TV station is desired to be memorized, it can be stored in the desired channel by pressing the MEMORIZE button. The memory capacity consists of 16 channels (16 TV stations) and they can be memorized at random regardless of the kind (high or low) of the frequency.

Also the auto tuning is available in the following order.

UHF → VHF (H) → VHF (L)

and the band is automatically switched and at the same time the band indication is changed as follows.

U → H → L

The channels are backed up by the internal rechargeable batteries for one week.

#### 1-5. 14 Days (2 Weeks)/9 Programs Programmable Timer

9 program memory can store programs ① – ⑨ as follows.

① Once Program: Program ① – ⑤, once program stipulated within two weeks.

② Everyday Program: Program ⑥ – ⑦, program to start and stop at a fixed time every day.

③ Weekly Program: Program ⑧ – ⑨, program at fixed time and on fixed day every week.

The program can be stored for one week by the built-in rechargeable battery. The indication after power failure is made by the lighting of the clock set. If any program is desired to be skipped, it can be skipped by pressing the Cancel button, and it can be read out and used (by pressing the Memorize button) provided that a new program is stored.

#### 1-6. Front Operation Feather Touch Direct Function

The operation button is of feather touch type, and the lamp inside the operated button is lit so that it is easily confirmed which mode is being executed. Since the buttons not so often used during the ordinary operation are provided in the rear of the panel and operated by means of the operation rod provided, there is no fear of the memory erased due to misoperation.

For recording, just press the "REC" button (one touch recording method).

#### 1-7. Infrared-ray Wireless Remote Control

The infrared-ray wireless remote control with the operational distance of about 6 m and the angle of 25° (in case of no reflection). The power can also be turned ON and OFF. Indicator lamps are provided so that the battery condition and transmitting condition can be seen at a glance. VS-5 itself incorporates an indicator lamp to show the receiving condition, and it can be confirmed whether the signal from the remote control has been transmitted correctly to the unit. The remote control has an "SAFETY LOCK" Switch to prevent its misoperation.

### 1-8. Auto REW Operation

When picture recording or playing back is completed, the tape is automatically rewinded to the tape counter "0000" (when counter memory is pressed) or to starting end of the tape. This function is very convenient especially in timer recording because the machine is stopped only after the tape is rewinded to the start when the recording is completed to the end of the tape thus enabling the record to be played back soon.

### 1-9. AEC Operation (Automatic Editing Control)

The unit incorporates the AEC mechanism which prevents the picture disturbance at the joint between a cut and a cut. It prevents the disturbance by rewinding the tape at an equal speed for a fixed time (a fixed length) and playing it back thus putting the track arrangement in order between the cuts.

### 1-10. Accurate Counter

If the tape passes the point of "0000" in FF or REW, the tape is forwarded or reversed a little to stop at the counter indication "0000".

When the tape is not loaded, the counter cannot be reset.

### 1-11. 4 Motors Mechanism

To stabilize the operation an independent motor is provided for each mechanism.

- 1) Head Motor (Quartz Direct Drive Method)
- 2) Capstan Motor
- 3) Loading Motor
- 4) Reel Motor

### 1-12. 3 Micro-processors

By using separate micro-processors, the complicated circuit are controlled comparatively simply.

- 1) Micro-processor for mechanism control
- 2) Micro-processor for tuner control
- 3) Micro-processor for timer control

Especially the memory in the timer and tuner circuits is backed up by the built-in rechargeable batteries, and when a power failure is detected, all the data stored in the timer and tuner are stored in the memory.

The unit has a program to check itself when the power is turned "ON", and if any abnormality is found, it issues the buzzer alarm and indicates "breakdown" on the FLD.

### 1-13. Breakdown Mechanism

When the self-checking mechanism finds a breakdown or the operation of the mechanism fails, the buzzer is sounded and the breakdown is indicated on the FLD. Also the breakdown turns the power OFF and makes all the operations disable. When the cause is removed, it can be reset by the OFF → ON operation of the main power.

### 1-14. Channel Set OSC

The unit incorporates an oscillator for channel setting so that the RF converter can be set swiftly and accurately in an empty channel of the TV.

### 1-15. Input Automatic Switching

When the video signal is inputted in EXTERNAL VIDEO IN TERMINAL, EXT. IN mode is automatically obtained.

## 2. SERVO CIRCUIT

### 2-1. Outline of Servo Circuit

The servo circuit of VS-5 uses the capstan servo system.

Therefore, for the tracking control when playing back, the drum motor is driven at a fixed phase and the C.T.L. phase is matched by controlling the speed of the capstan motor. The relationship between the reference signal and comparison signals of various modes is shown in Fig. 8.

|       | HEAD MOTOR            |            | CAPSTAN MOTOR           |                   |
|-------|-----------------------|------------|-------------------------|-------------------|
|       | REFERENCE             | COMPARISON | REFERENCE               | COMPARISON        |
| REC   | INPUT VIDEO<br>V Sync | P.G.       | INPUT VIDEO<br>V Sync/2 | $\frac{C-FG}{16}$ |
| PB    | * X'tal               | P.G.       | * X'tal                 | CTL               |
| X9 PB | X'tal                 | P.G.       | Drum P.G.               | $\frac{CTL}{9}$   |

(\* In AEC, the reference signal of PB is the input video V sync.)

Fig. 8

## 2-2. Drum Servo Circuit

### 2-2-1. Rec Mode

#### 1) Phase Control

For the reference signal when recording, V-Sync is used which is the input signal separated through the Sync separator of the video circuit.

This signal is inputted in IC1 ②⑦ and separated into two systems within the IC, and one signal is 1/2 counted down through MM, outputted from Pin ⑥ through CTL REC AMP, and supplied to C.T.L. Head through Terminal ②. Another signal is added as a trigger signal to the trapezoid wave form generator within the IC1 through FF. The comparison signal generated by the P.G Head is level adjusted by VR1 and supplied to Pin ②④. Then, the signal is separated into two and added to Mono – Multi, where the phase of the switching pulse is adjusted (VR3, VR4) and they are outputted from Pin ②⑩. A part of the above Mono-Multi output is again added to MM3 through the Gate. Here the switching point in recording is determined by the time constant by VR2 and C12. Then the output signal passes the gate and is added to S/H circuit (sample & Hold) as a sampling pulse. On the other hand, the trapezoidal wave produced by the trapezoidal wave form generator is also added to the S/H circuit and sampled by the above sampling pulse, and the output is stored in the hold circuit. (C14). The signal sampled and held is outputted from Pin ②⑮, and then, the phase control signal is added to the speed control circuit through R17 and R21.

#### 2) Speed Control

The output from DM-FG is amplified by IC5 1/2 and added to IC1 ②④, and the input is added to the speed control MM within the IC5 as a trigger signal. The time constant of the speed Mono-Multi is determined by VR6, R23 and C16 because the IC2 electronic switches Pins ⑨ and ⑧ are energized in Rec mode. The output is taken out of Pin ⑧ and added to IC5 (1/2) Pin ⑥, and the output is taken out of Pin ⑦ and added D.M. control circuit through Terminal ③.

### 2-2-2. Play Back Mode

#### 1) Phase Control Circuit

For the reference signal in PB mode, the signal generated by the X'tal OSC of Y/C PCB is used after being counted down to 50 Hz, as shown in Fig. 8. Others are exactly same as for recording mode.

#### 2) Speed Control Circuit

##### a) Normal Speed Play Back

Exactly same operation as for recording.

##### b) Cue or Review

The relative speed of the video head and the tape in CUE (X9 forward play) is reduced by about 4% in comparison with that under normal condition. The reason is that the running direction of the tape and the rotating direction of the video head are the same.

How the video head traces the pattern on the tape is shown in Fig. 9. On the other hand, the relative speed of the video head and the tape in REVIEW (X9 reverse play) is reduced by about 4.06% in comparison with that under normal condition. The reason is that the running direction of the tape and the rotating direction of the video head are opposite. As aforementioned, since  $f_H$  and  $f_V$  change in CUE and REVIEW thus making the synchronization of the TV picture unavailable, the stable picture will not be obtained on the TV screen.

To prevent this and to make  $f_H$  (horizontal frequency) of the playback video signal normal, the speed of the drum motor is changed.

$f_V$  (vertical frequency) also changes but it will pose no problem because the vertical synchronization range of TV is wide.

##### \* Reference:

- Reduction of relative speed in CUE mode

$$\frac{-(1 + 9) \times 23.39}{(25 \times 62 \times 3.14) - 23.39} \times 100 = 4.82\%$$

- Increase of relative speed in REVIEW mode

$$\frac{(-1 + 9) \times 23.39}{(25 \times 62 \times 3.14) - 23.39} \times 100 = 3.86\%$$

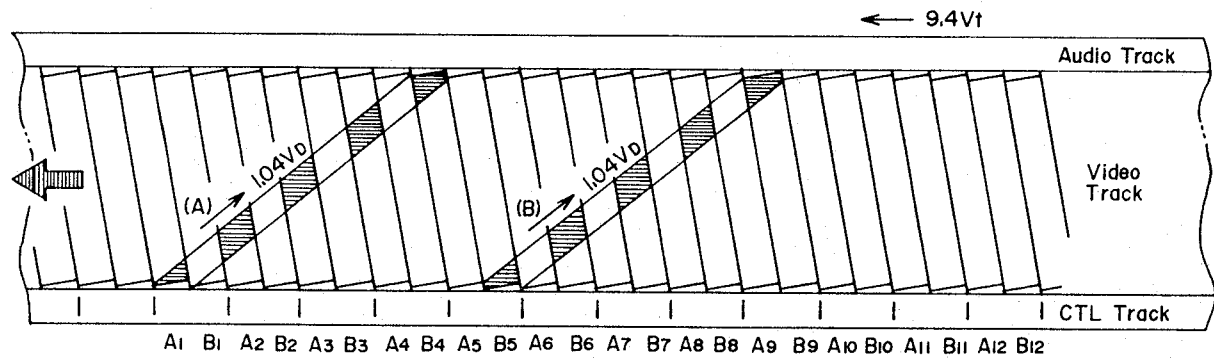
The output in each mode of IC3 is shown in Fig. 10.

##### c) CUE Mode

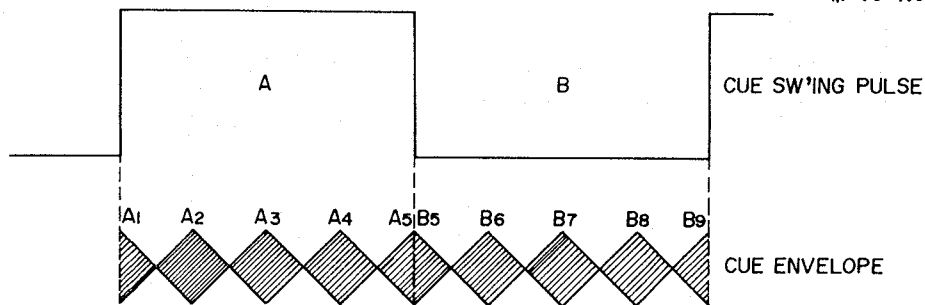
In CUE mode, IC3 ②⑪ → 'H' → IC2 ②⑫ → 'H' → IC2 ②⑪ – ②⑪ → ON as shown in Fig. 10, and the time constant of the speed control MM within IC1 is determined by VR5, R22 and C16, and the speed of the head motor is increased by the reduction (4.82%) of the relative speed of CUE mode described above.

##### d) REVIEW mode

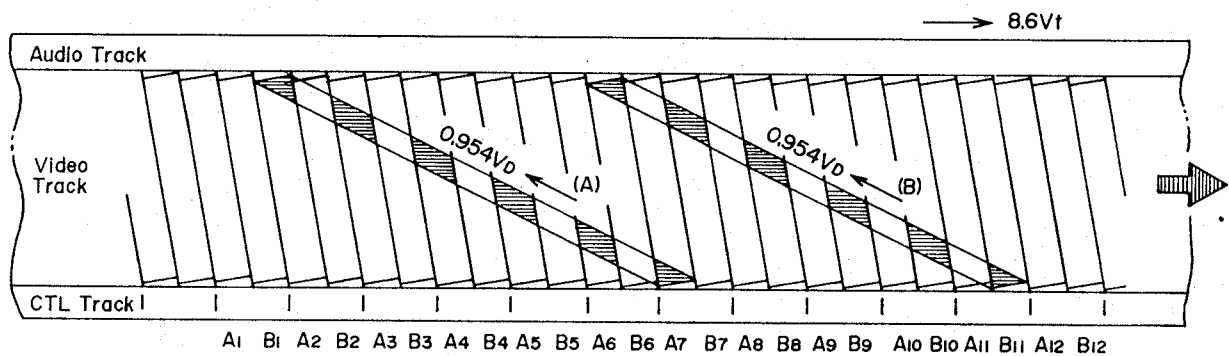
In REVIEW mode, IC3 ②⑩ → 'H' → IC2 ②⑬ → 'H' → IC2 ②⑩ – ②⑩ → ON as shown in Fig. 10, and the time constant of the speed control within IC1 is determined by VR7, R24 and C16, and the speed of the head motor is reduced by the increase (3.86%) of the relative speed of REVIEW mode described above.



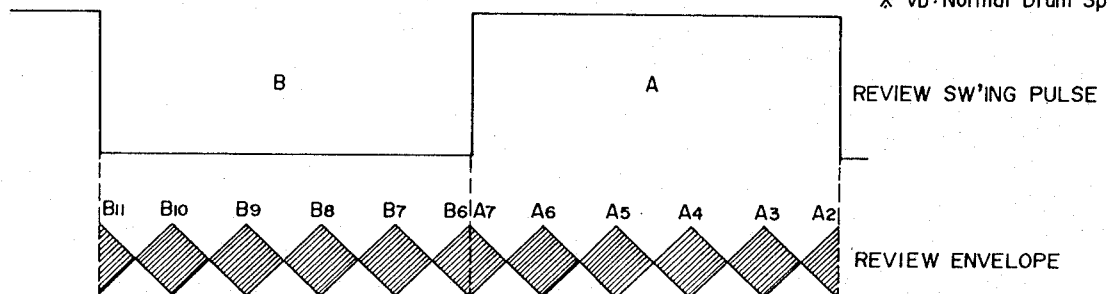
\* Vt : Normal Tape Speed  
 \* Vd : Normal Drum Speed



(a) CUE MODE



\* Vt : Normal Tape Speed  
 \* Vd : Normal Drum Speed



(b) REVIEW MODE

Fig. 9

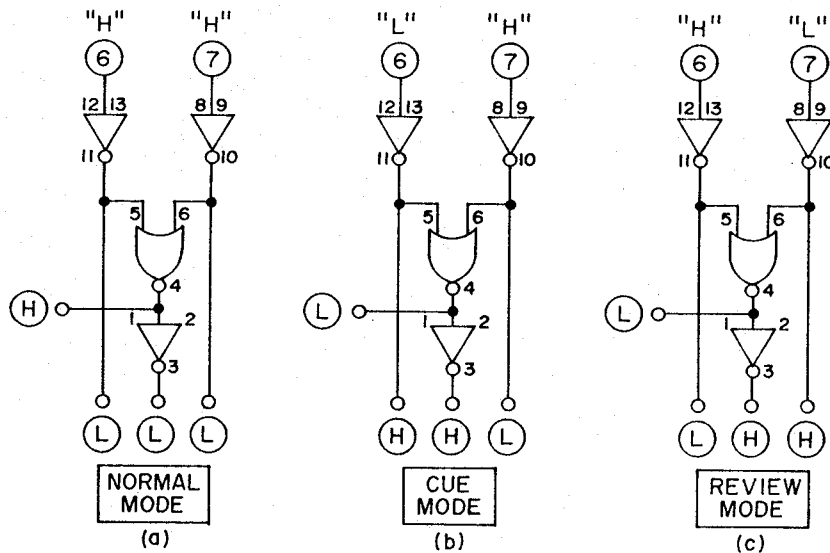


Fig. 10

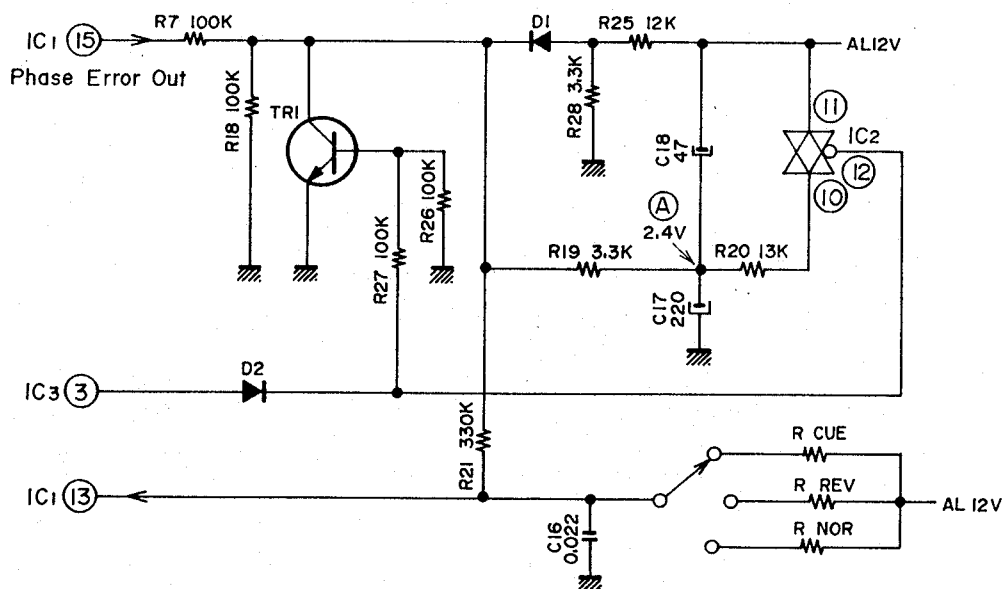
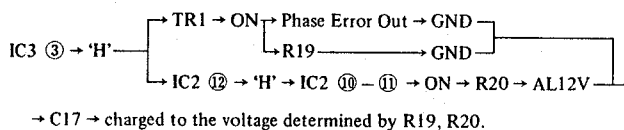


Fig. 11

### 3) Additional Circuit for Drum Motor Speed Control

Since the drum motor phase control is not required in SPEED mode, it is eliminated by turning TR1 ON.



The circuit shown in Fig. 11 is intended to return

the speed of the head motor to the steady rotation immediately when the mode is returned from SPEED to NORMAL, and it adds the potential given to C17 in SPEED play immediately to the speed control circuit in NORMAL mode instead of the phase error. To improve the rising from the power ON, C18 is inserted, and immediately when AC12V is supplied, this charges the potential at A point (Fig. 11) to the value of steady state (potential near to DC + 2.4V).



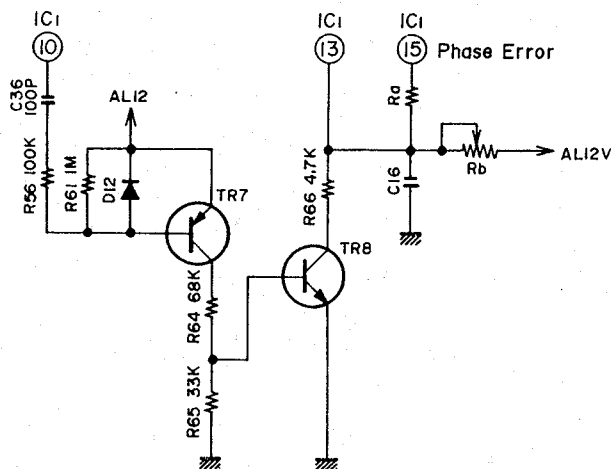


Fig. 12

The circuit shown in Fig. 12 is intended to prevent the Drum motor from being locked at double speed, and when it is being locked at double speed, IC1 ⑩ becomes 'L', TR7 ON, TR8 ON, and IC1 ⑬ is grounded by R66 to prevent the locking.

When DM starts,

$$\text{IC1 } 8 \rightarrow \text{L} \rightarrow \text{IC5 } 7 \rightarrow \text{H} \rightarrow \text{TR6} \rightarrow \text{ON} \begin{cases} \rightarrow \text{TR1} \rightarrow \text{ON} \\ \rightarrow \text{IC2 } 12 \rightarrow \text{H} \rightarrow \text{IC2 } 10 \dots 11 \rightarrow \text{ON} \end{cases}$$

and it charges the alternate voltage for phase control to C17 and makes the phase control easier when the DM speed becomes constant.  
(Same operation as for CUE/REVIEW)

### 2-3. Capstan Servo Circuit

### 2-3-1. Rec Mode

### 1) Speed Control Circuit

The capstan motor has FG. FG output is 500 rpm, 3,600 Hz.

The FG output of the capstan motor is amplified by TR5 and added to IC4 ⑩. The signal passes FG amplifier → FF1 → FF2 within the IC4 and is added to MM2. The time constant of MM2 is

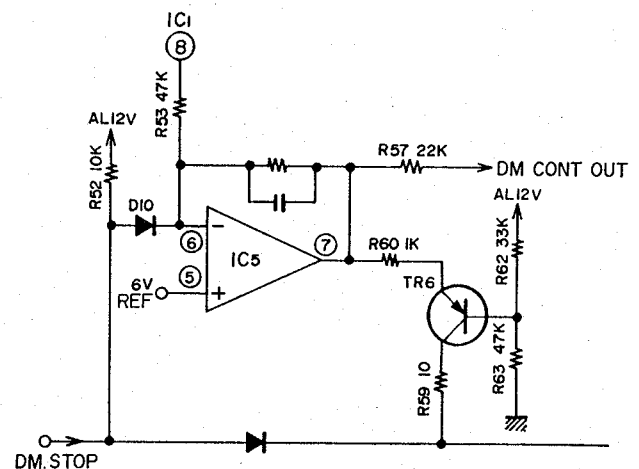


Fig. 13

determined by C27, VR8 and R67. This is because the Rec mode forces normal speed as shown in Fig. 10, IC3 ④ → 'H' → IC8 ⑨, ⑩, ⑪ → H, and the electronic SW of IC8 is at the normal side, and VR8 and R67 are selected. Then, the signal passes the gate and makes the trapezoidal wave. (delayed signal).

The trapezoidal slope will be IC3 ③ → L → TR10 → OFF when normal, and is determined by R74 and R75. On the other hand, the signal from FF2 passes the inverter, and together with the signal from MM2, triggers FF3 and uses the output as a sampling pulse (current signal) to sample the trapezoidal wave previously made. The output is held in the hold circuit and outputted from IC4 ⑦, and the output is added to TR11 through the clamping circuit consisting of D14, R80 and R81, and the output is amplified about 30 dB by TR11 and taken out of P33 ④ as the capstan motor control output.

The signal from the phase control circuit is added to IC4 ③ and mixed with the speed control signal. Actually the apparent time constant is changed by adding the DC voltage of phase error to the circuit of IC4 MM2. (Fig. 14)

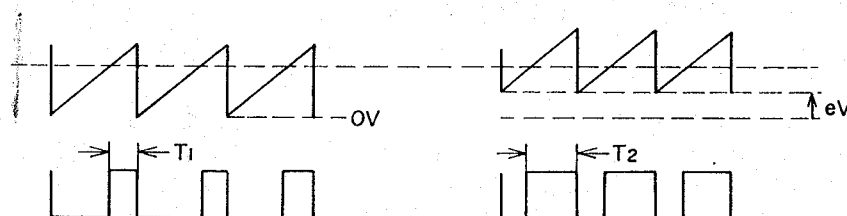


Fig. 14

## 2) Phase Control

The reference signal when recording is input V sync. The composite sync inputted into IC1 ②⑥, after passing V<sub>SS</sub> and FF within IC1, is outputted from IC1 ⑩ as V-pulse. As seen from the normal mode in Fig. 10, IC3 ④ → 'H' → IC6 ⑤ → 'H' → IC6 ③ - ④ → ON, and the signal is added to TR2. Passing the emitter follower of TR2, it is inputted from IC4 ⑬ to make the reference trapezoidal wave. In the case of comparison signal, the signal  $\frac{400 \text{ Hz}}{2}$  obtainable from IC4 ⑤ of the capstan motor FG circuit is amplified and inputted into the electronic SW IC8 ③, and the output can be obtained from IC8 ④ because of normal mode, and the output is inputted in the 1/8 countdown circuit IC7 ①. The output is taken out of IC7 ⑨ as 25 Hz. This is differentiated by R100 and C41, wave formed by TR15 and inputted to IC1 ③. In REC mode, the output is obtained from IC1 ② and it is again inputted into the electronic SW IC8 ① and taken out of IC8 ⑮. This is inputted into IC4 ⑮ and passed through the PG amplifier within the IC4 → MM1 → gate, and the sampling pulse as a comparison signal is obtained. In REC mode, J104 ② → L → TR3 → ON, so the time constant of MM1 is determined by R32, R11, R43 and C26.

The trapezoidal pulse (produced from input V sync), reference signal, is sampled by the sampling pulse ( $\frac{400}{2} \times \frac{1}{8} = 25 \text{ Hz}$ ), comparison signal, and is added to the speed control circuit of IC4 ③ through the hold circuit.

## 2-3-2. Normal PB Mode

### 1) Phase Control Circuit

The comparison signal of the phase control circuit is obtained from CTL head. The output of CTL head is inputted into IC1 ⑥. In PB mode, the CTL REC amplifier of IC1 is turned OFF, and the CTL amplifier output within the IC passes the electronic SW within the IC and is outputted from IC1 ②. In NORMAL mode, IC8 ① is selected and the output is made from IC8 ⑮. This is inputted into IC4 ⑮ and it passed through PG amplifier → MM1 → gate, and samples the reference signal as the sampling pulse. Here the tracking is controlled by MM1.

In PB,

J104 ② → H → TR3 → OFF so the time constant of MM1 is determined  
→ D7 → ON,

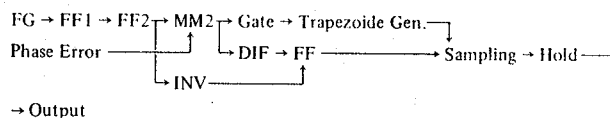
by EXT. VR, VR11, R43 and C26.

In the case of reference signal, the X'tal oscillator signal counted down to 50 Hz obtainable from the signal circuit as well as the drum motor circuit is inputted into IC1 ②⑥ and 1/2 counted down to obtain 1/2V pulse from IC1 ⑩. This V pulse is

inputted into IC4 ⑬ via IC6 electronic SW and TR2 to make the trapezoidal pulse, the reference signal within the IC4. This reference signal is sampled by the comparison signal (produced from CTL) previously made and is outputted from IC4 ⑨, and then it is inputted into the speed control circuit IC4 ③.

### 2) Speed Control Circuit

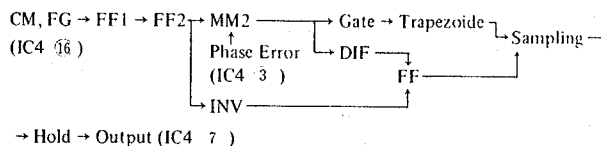
As in REC mode, from the signal from C.M. FG, the output is obtained within the IC4 by the following operation.



## 2-3-3. Speed Play Mode [in this mode, all the IC8 (electronic SWs) are at SPEED side]

### 1) Speed Control Circuit

In SPEED PLAY mode, the only difference in operation between CUE mode and REVIEW mode is that the time constant of MM2 within the IC4 for the speed control circuit is changed, and this part only will be described below. The signal from CM, FG is processed within the IC4 as follows to output the CM control signal.



### a) CUE Mode

IC3 ⑪ → 'H' → IC6 ⑥ → 'H' → IC6 ⑧ - ⑨ → ON, so the time constant of MM2 is determined by VR10, R68 and C27.

Time constant for stable rotation at 9-fold speed.

### b) REVIEW

IC3 ⑩ → 'H' → IC6 ⑫ → 'H' → IC6 ⑧ - ⑨ → ON, so the time constant of MM2 is determined by VR9, R69 and C27.

Time constant for stable rotation at 9-fold speed.

In SPEED mode, J104 ⑨  $\overline{X2}$  → L → IC4 ② → L → FF2 → operation, so every other comparison signal is compared by the Mono-Multi time constant circuit designed so as to achieve stability usually at a set speed, and the speed system usually works to meet the speed logic, and as a result, the motor is driven at double speed. To achieve the rotation at 9-fold speed, the drive voltage of the CM drive circuit is made 30V instead of usual 17V. This switching is made by the power circuit.

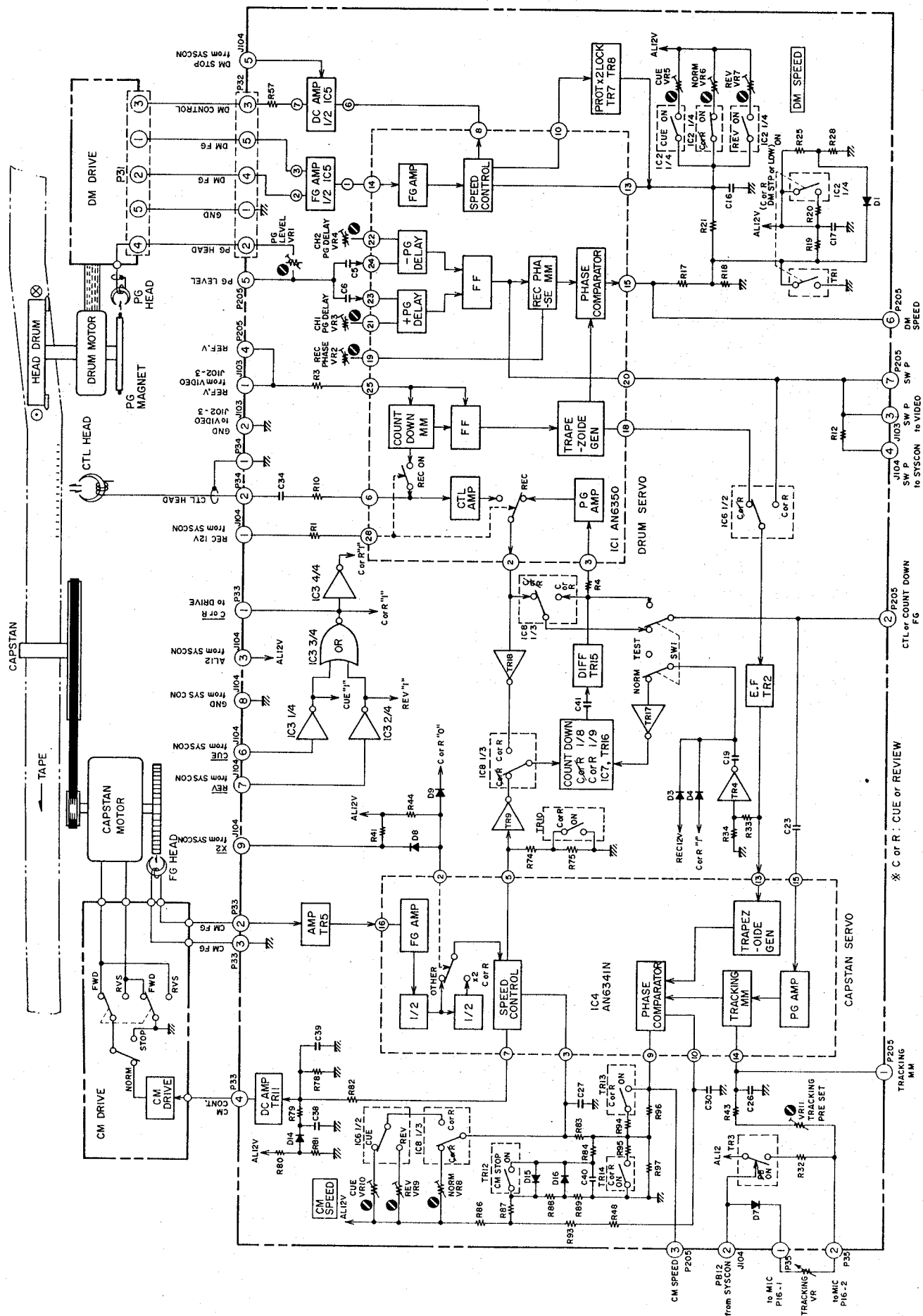


Fig. 15 SERVO BLOCK DIAGRAM

## 2) Phase Control Circuit

In SPEED PLAY, the phase control can match the phase of the video head with that of CTL by using as a reference the PG pulse obtainable from the head motor which is rotating quartz locked at a constant speed. As a result, the noise bar is fixed and easy-to-see picture is obtained.

In SPEED PLAY mode, IC3 ③ → 'H' → IC6 ⑬ → 'H' → IC6 ① - ② → ON, so 25 Hz obtained by the drum PG head is passed through IC1 ⑳ to IC6 ① - ②, and added to TR2. The TR2 Emitter follower output is added to IC4 ⑬ and converted into the trapezoidal wave within the IC4 as a reference signal. As for the comparison signal, the CTL signal (25 Hz × 9 = 225 Hz) obtainable from CTL head is inputted into IC1 ⑥ and outputted from IC1 ②. This is inputted into IC8 ⑤ through TR18 (inverter) and outputted from IC8 ④ and then, inputted into IC7 ①. Since the IC7 operates as 1/9 counter in SPEED PLAY mode (operational principle will be described later), from IC7 ⑨, 25 Hz is obtained. This is differentiated by C41 and R100, waveform shaped by TR15 and inputted into IC4 ⑮. IC8 ② → IC8 ⑮. It becomes the sampling pulse as a comparison signal by passing through PG → MM1 gate within the IC4. Here the reference signal (trapezoidal) produced from the drum PG is sampled by the comparison signal (sampling pulse) produced from the CTL and is outputted from IC4 ⑨ as a phase error.

## 3) 1/9 Count Down Circuit

In the circuit shown in Fig. 16, when NORMAL, ① is L, so D19 and D20 are cut off and TR16 is also cut off, therefore, no reset input from TR16, but when started, 1/2V sync is inputted and TR4 is turned ON by the first pulse after AL12 is added, and immediately when C19 is charged, TR17 is turned ON and the reset pulse is added to IC7 ②.

In SPEED, in Fig. 16, ① becomes 'H', and if there is no reset input when the 9th pulse of (IC7 ①) shown in the lower half of the Fig. 15 is inputted, then, Q1 → 'H', Q2 → 'L', Q3 → 'L', Q4 → 'H'. When both Q1 and Q4 become 'H', the potential at ④ point becomes 'H', TR16 is turned ON, TR17 also ON, and the reset pulse is inputted into IC7 ②. Immediately when the reset pulse is inputted, Q1, Q2, Q3 and Q4 all become 'L'. With the reset point "0", the pulse is again counted. Therefore, the pulse of IC7 ⑨ will be one pulse output against 9 pulse input, i.e. 1/9.

## 4) Phase Compensation Circuit and Limiter Circuit

The phase error signal coming from IC4 ⑨ is passed through the phase compensation circuit for stabilizing the system and added to the MM2 circuit of the speed control circuit to control the phase of the motor.

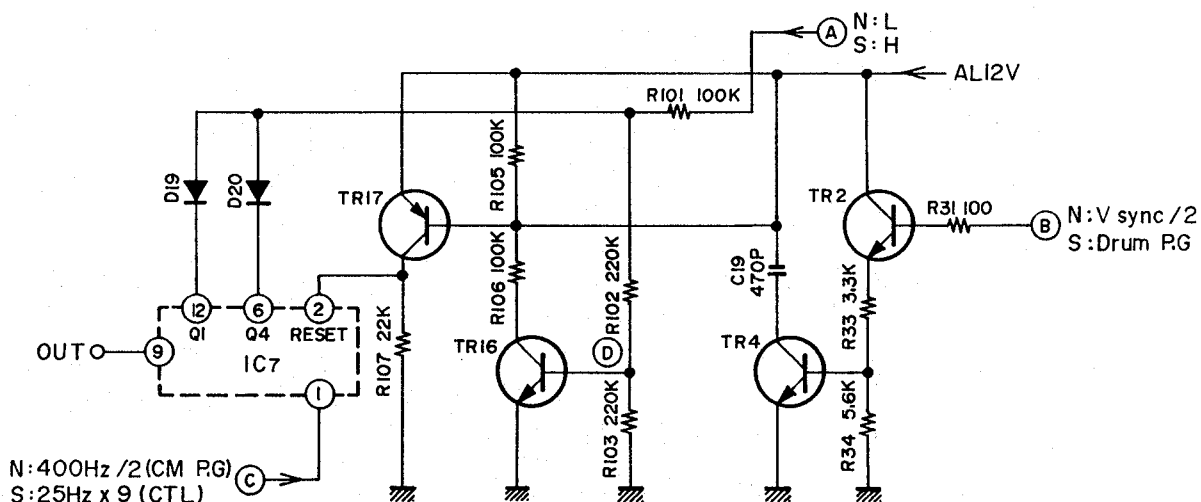


Fig. 16

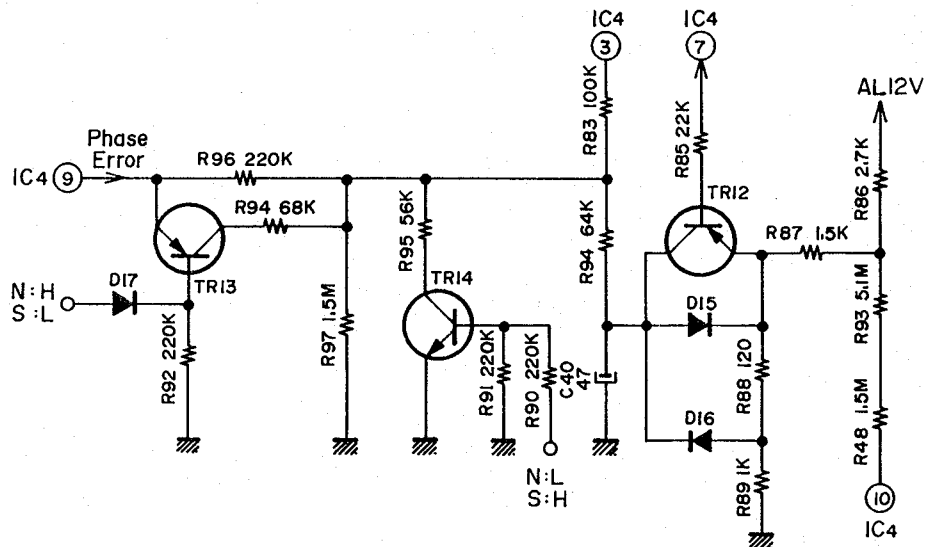


Fig. 17

#### a) Normal Mode

TR13 → OFF, TR14 Base → 'H' → TR14 → OFF, and then as shown in Fig. 18. At this time, the voltage applied to the IC4 ③ is determined by R96 and R97. In other words, the voltage of R97 is added to IC4 ③. The specified number of rotation at this time is 500rpm.

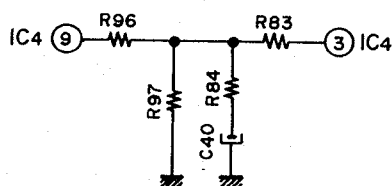


Fig. 18

#### b) Speed Play Mode

TR13 → ON, TR14 → ON, and then, as shown in Fig. 19. The voltage applied at this time is determined by R96//R94 and R95//R97. In other words, the voltage of R95//R97 is added to IC4. The specified number of rotation at this time is 4,500 rpm.

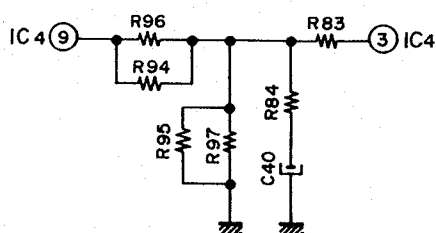


Fig. 19

#### c) Limiter Circuit

The charge-discharge time of C40 of the phase compensation circuit effects greatly the starting characteristic of the capstan motor. Therefore, the starting characteristic is improved by keeping the potential of C40 within the lock range of the phase control system and by shortening the charge-discharge time.

##### c-1) When motor starts:

IC4 ⑦ → L → TR12 → ON. Therefore, the voltage of C40 will be:

$$\frac{(R88 + R89) \times 12}{R86 + R87 + R88 + R89} \text{ (V)}$$

Not passing to R96 and R94 (time constant is small,  $R96 + R94 \gg R87 + R86$ ), the power is charged instantly to the value near the specified voltage.

##### c-2) Normal rotation

TR12 is cut off and the voltage  $E_C$  of C40 is kept within the following voltage range (servo lock range) and the limiter is applied to the phase error.

$$\frac{R89 \times 12}{Z} - 0.65 \leq E_C \leq \frac{(R88 + R89)}{Z} \times 12 + 0.65$$

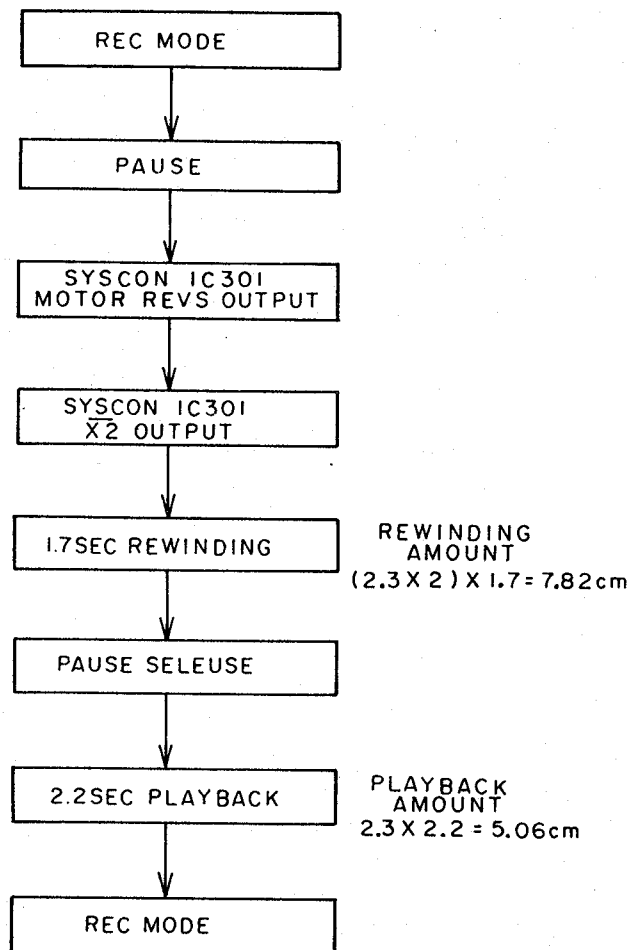


Fig. 20

#### 2-4. A. E. C. (Automatic Editing Control)

This is the circuit to prevent the disturbance of the picture at the joints between pictures. This occurs because the next picture recording is started independently of the recorded track pattern and the new and old track patterns and control signals becomes discontinuous (uneven). To solve this problem, VS-5, when the pause button is pressed during recording, rotates the capstan motor at double speed with the pinch roller compressed, and rewinds for a fixed time (about 1.7 sec.) and waits for the next recording.

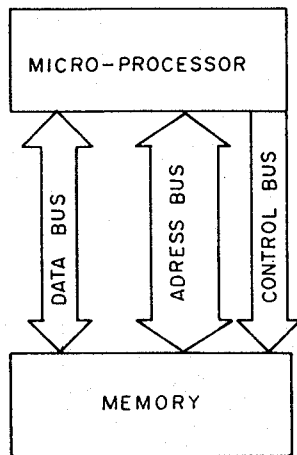
And when the pause is released, the playback mode is achieved (2.2 sec.) and after tracking, the recording is started. At this time, to prevent the occurrence of the phase disorder, the V. sync of input video signal is used as the servo reference signal when recording. (Fig. 8)

Motor reverse,  $\overline{X2}$  (double speed) and rewinding time are all set by IC301 within the system control.

#### 3. SYSTEM CONTROL AND TUNER & TIMER

System control circuit using two microprocessors carries out the control of tuner and timer system, and the control of system controls such as mode control, safety operation and warning operation. The memory of the tuner system is backed up for about one week by the built-in batteries when the power fails. For the principle of the microprocessors, refer to the special book. The principles are shown in Fig. 21.

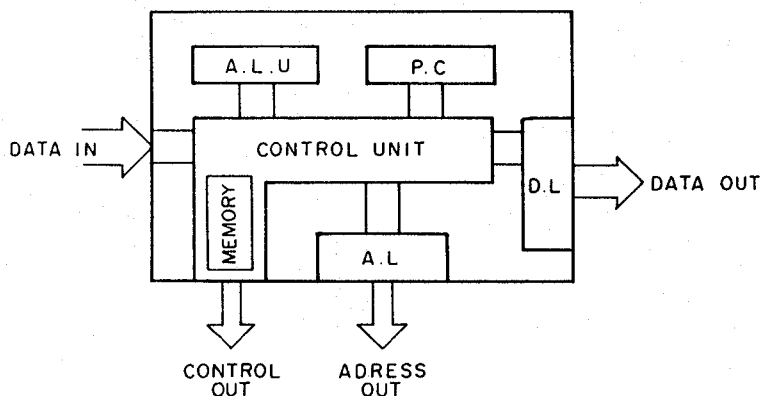
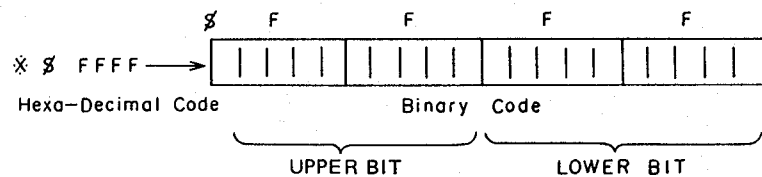
The output/input terminals of the microprocessors are shown in Fig. 22.



DATA BUS: WRITING & READING  
 \* During Writing, Not Reading

ADDRESS BUS: RESERVING for Writing or Reading  
 (\$ 0000 ~ \$ FFFF)

CONTROL BUS: Commanding of Writing or Reading  
 for Memory



ALU: Arithmetic Logic Control Unit  
 P.C : Program Counter  
 A.L : Address Latch  
 D.L : Data Latch

- (1) Fetch Cycle
- ① Read P.C # by Control Unit
  - ② Set P.C Address on A.L by Control Unit
  - ③ Send Address to Memory by Control Unit
  - ④ Get Address Information by Control Unit
  - ⑤ Store Information in Memory by Control Unit  
 8 Bits → P.C +3
- (2) Execution Cycle
- ① Processing Memory Information in A.L.U by Control Unit
  - ② Send Result to D.L by Control Unit
  - ③ Store Data in Memory by Control Unit

Fig. 21

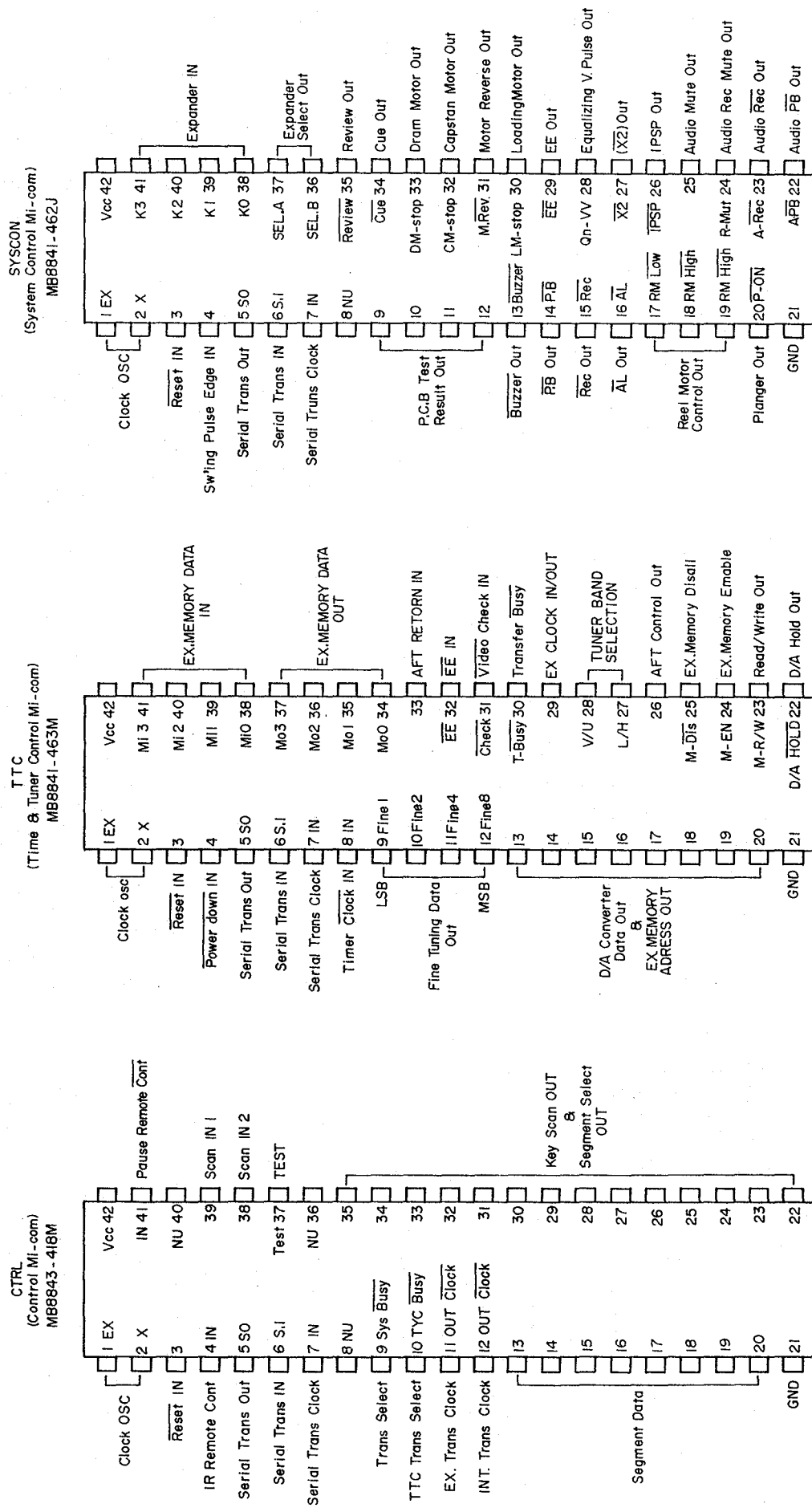


Fig. 22



### 3-1. Tuner & Timer Control Circuit

For the tuning method of VS-5, the voltage controlled synthesizer method is used. In this method, the tuning voltage is converted into the digital amount and stored in the memory, and the digital amount of the channel selected is again converted into the tuning voltage by the D/A converter.

The approximate diagram is shown in Fig. 23. Also VS-5 incorporates a program in the IC307 which reads out the data of this digital memory when timer recording and carries out the timer recording. This

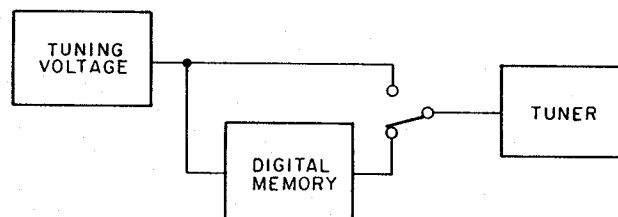


Fig. 23

IC307 and the circuits attached are called Tuner Timer Control Circuits hereinafter.

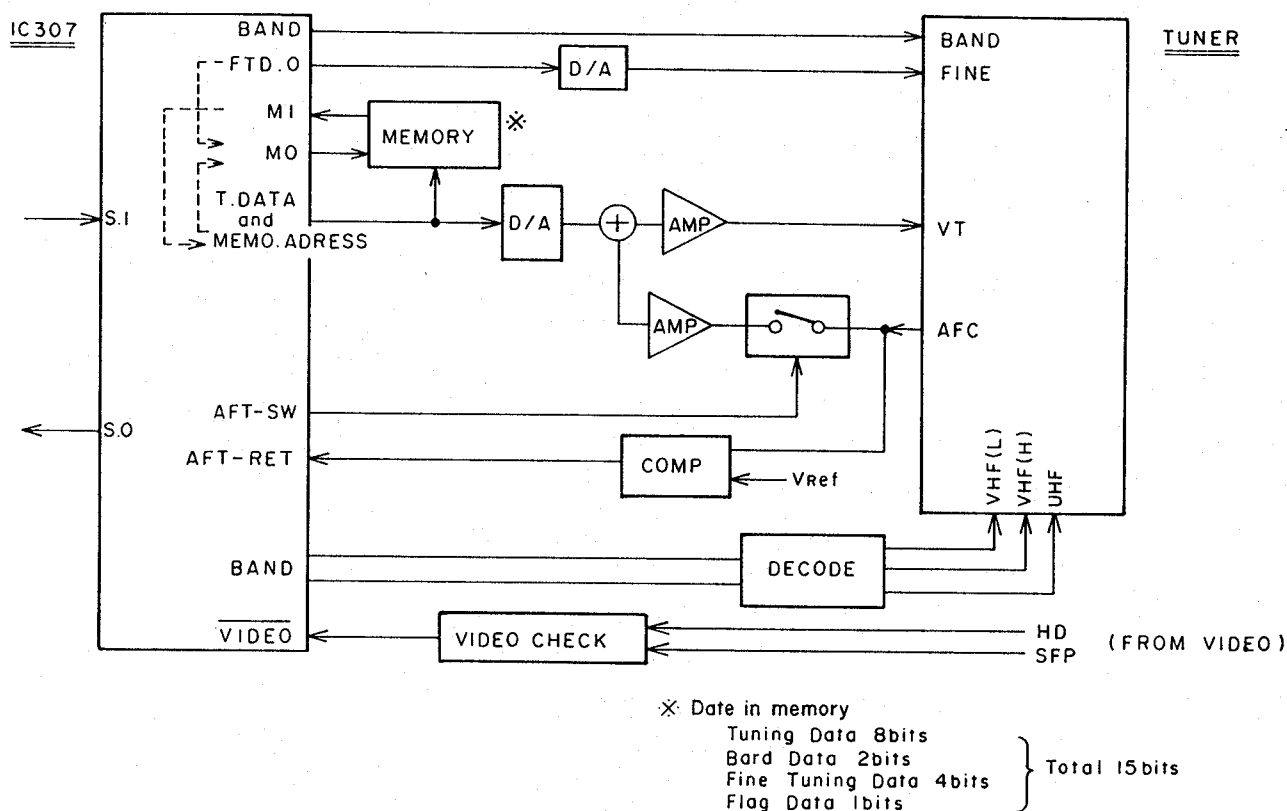


Fig. 24

#### 3-1-1. Summary of Tuning

Fig. 24 is a block diagram of the tuning circuit. When any tuning commanding data enter the S.I. (Serial Input), IC307 outputs tuning data (VT: 8 bits) and band data (2 bits). The band data are directly supplied to the tuner, but the tuning data are converted into analogue voltage by the D/A converter and then supplied to the tuner. In the tuner, the tuning frequency is changed by this tuning voltage, and when a TV station is received, the voltage proportional to the tuning status is outputted to the AFC output of the tuner. This voltage is checked by the comparator and the exact tuning point is detected. If there is any deviation from the exact

tuning point, the FINE tuning button is pressed to issue the fine tuning command to IC307 through the S.I. input. By this instruction, the fine tuning data (4 bits) are outputted from FTDO (Fine-Tuning Data Output), D/A converted, and inputted into the "FINE" of the Tuner.

If the "memorize" button is pressed when the tuning is completed, the address of the channel shown on the display is outputted from the Memory-Address Terminals, and the total 15 bits including tuning data (8 bits), fine data (4 bits), band data (2 bits) and flag data (1 bit) are stored in the same address as 4 words (16 bits).

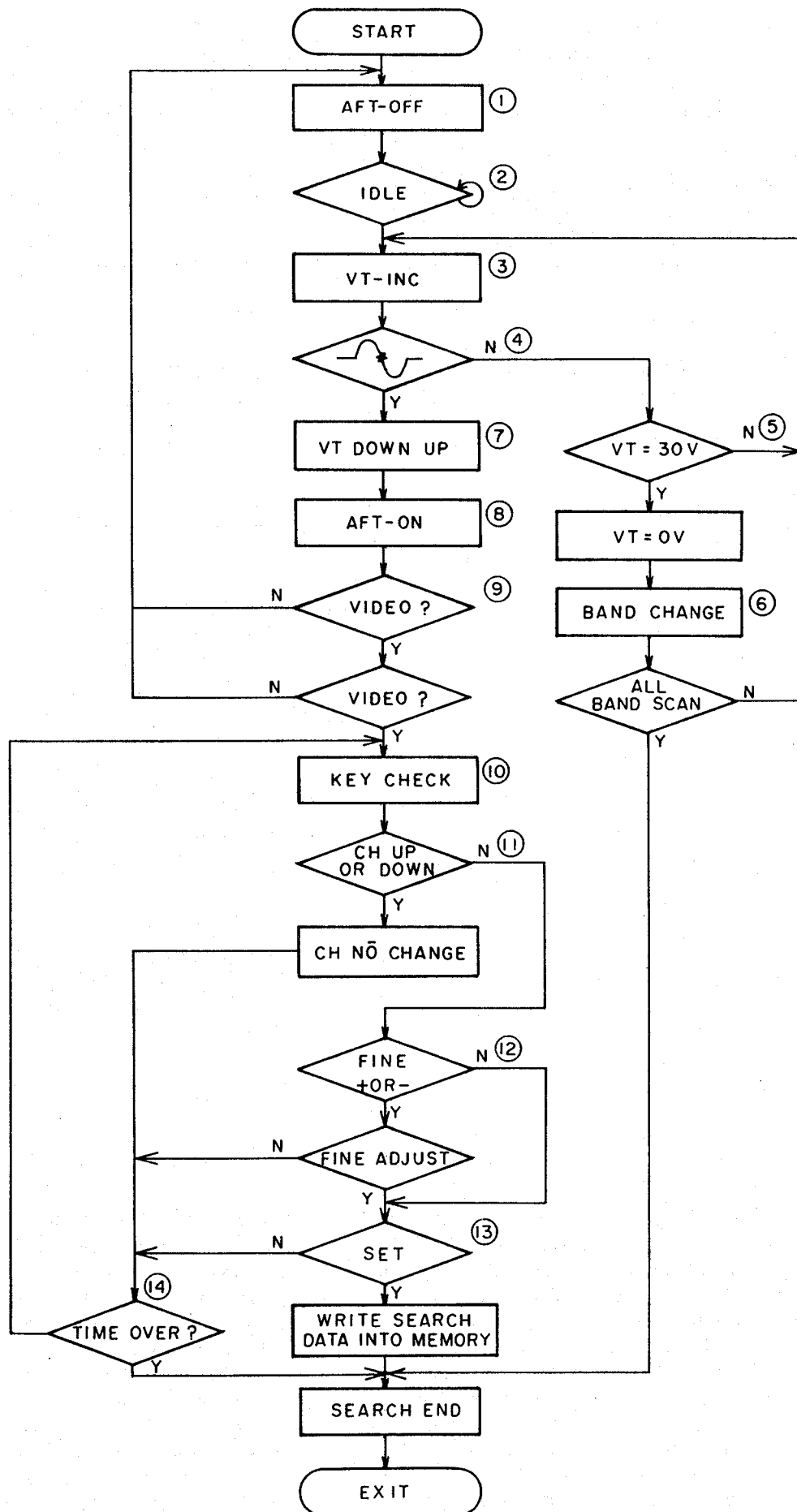


Fig. 25

### 3-1-2. TV-Search

The TV-Search is executed in accordance with the flow chart shown in Fig. 25. Each operation is described on basis of this flow chart.

- 1) If any AFT data exist, correct tuning is impossible, so the AFT circuit is turned OFF, and only the data from the microcomputer are supplied to the tuner. (IC307 ②⑥ → 'L' → IC311 ⑫ → 'L' → IC311 ⑩ - ⑪ → OFF).
- 2) When the AFT SW is turned OFF, a change will occur in the AFC output of the tuner to change the AFT-Return Signal, and therefore, scanning is delayed for about 60 mS. (By the program within IC307).
- 3) Determination of intervals to increase VT. Depending on the band, they will change as shown in Fig. 26.

|      | VHF (L) | VHF (H) | UHF   |
|------|---------|---------|-------|
| FAST | 60 mS   | 60 mS   | 60 mS |
| SLOW | 30 mS   | 30 mS   | 12 mS |

Fig. 26

Into the tuner, data are inputted depending on each mode by IC307 ②⑧ and ②⑦, and at the same time, 'H' is added when IC311 ⑤ is 'U', and IC311 ③ - ④ → ON.

- 4) When the tuner receives broadcast or noise, the waveform shown in Fig. 27 is outputted at AFC OUT. This AFC output is inputted in IC313 ⑥. This circuit is called AFC comparator and the operation is described by using Fig. 28.

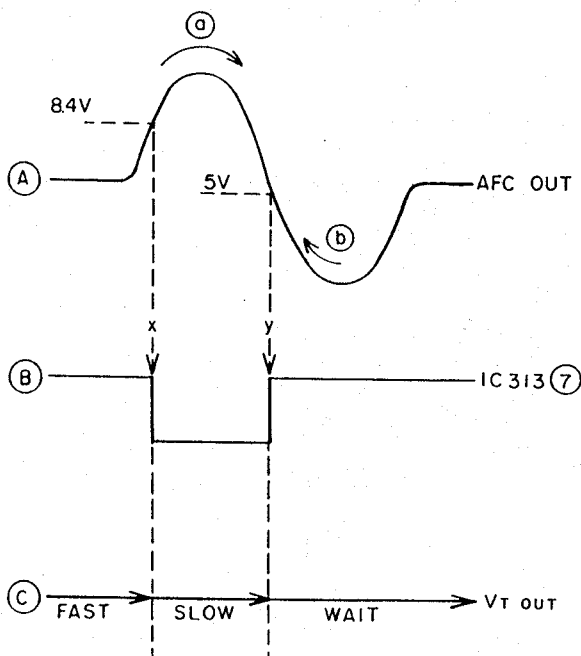


Fig. 27

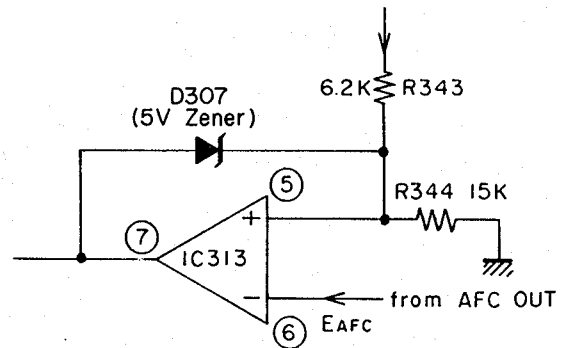


Fig. 28

If the voltage of AFC OUT of IC313 ⑥ is  $E_{AFC}$ , and when the tuner is not receiving a TV station,  $E_{AFC} < IC313 \text{ ⑤} \rightarrow IC313 \text{ ⑦} \rightarrow H \rightarrow D307 \rightarrow OFF$ . At this time, the voltage of IC313 ⑤ is:

$$\frac{12}{R343 + R344} \times R344 = 8.4V.$$

If the tuner receives a TV station and  $E_{AFC} < 8.4V$ , then  $IC313 \text{ ⑦} \rightarrow 'L' \rightarrow D307 \rightarrow ON \rightarrow IC313 \text{ ⑤} \rightarrow 5V \rightarrow VT \rightarrow SLOW$ . And when the tuner passes the exact tuning point,  $E_{AFC} < 5V \rightarrow IC313 \text{ ⑦} \rightarrow H \rightarrow D307 \rightarrow OFF \rightarrow VT \rightarrow WAIT$ .

- 5) For the VT, the tuner requires the change of 0 ~ 30V and the microcomputer output is 8 bits.

Therefore, one-STEP is  $\frac{30V}{256} = 117 \text{ mV} \approx 120 \text{ mV}$ .

One-STEP change means in frequency:

VHF (Low) : 0.16 MHz

VHF (High) : 0.25 MHz

UHF : 1.68 MHz (all average)

8 bits output from microcomputers ⑬ ~ ⑳ is inputted into IC309 D-A converter IC309 ⑤ ~ ⑫, taken out of IC309 ④ as analogue current output, converted into analogue voltage by IC310, and CR302 and added to Analogue SW IC311 ①. On the other hand, IC307 ②② → 'L' → TR310 → ON → IC311 ⑥ → H → IC311 ⑧ - ⑨ → ON → C306 (terminal voltage) is passed through R351 (When UHF, ON between TC311 ③ and ④, so directly), added to IC312 ⑥, inverted by IC312 and added to IC310 ②. This terminal voltage of C306 will be the reference voltage in tuning. (This reference voltage is a little higher than the flat portion of Fig. 27, and the reason is that it can be drawn sufficiently even when it enters the ⑥ part).

Therefore, when AFT-ON, if the voltage of AFC OUT is higher (or lower) than the reference voltage, any malfunction due to disturbance such as the temperature change of the tuner is prevented by lowering (or increasing) the voltage by the difference.

- 6) The band is scanned in the order of VHF (low) → VHF (high) → UHF, and the VT at the search start will be the voltage previously set.

When neither broadcast nor noise is received, 4

bands including the band at start are scanned. The band scanning signal is outputted by the microcomputer IC307 (28) and (27).

- 7) IC313 (7) changes at the exact tuning point or near to it as shown by y point of Fig. 27 (B). The VT changes slowly because it passes the differentiation circuit after IC309 (DA converter). Therefore, the scanning is finished at a point beyond the best tuning point. Here, after one step down, the exact tuning point is checked by the program incorporated within the microcomputer IC307. If the exact tuning point is the place where one step is returned, it is kept as it is, but if different, one step is returned to the original place. After AFT is turned ON, video or noise is determined.

- 8) When the exact tuning point is confirmed by the above 7), microcomputer

IC307 (26) → H → IC311 (12) → H →  
 IC311 (10) - (11) → ON  
 TR310 → OFF → IC311 (6) → L  
 → IC311 (8) - (9) → OFF

and, AFT is in ON position.

- 9) AFT SW is turned ON to achieve the normal control status. (For the video check, see the following 10.)

- 10) About 500 ms after the AFT SW is turned ON, the video-check is made to determine whether the signal being received is video signal or noise, and if it is determined as video signal, another video-check is made after 60 msec. If the result is video signal (IC315 (3) → 'L') the search-end mode, and the searched data can be set. (The keys acceptable in the search-end mode are: FINE +, FINE -, SET, CH-UP, CH-DOWN). The operation of the video check circuit is as follows.

The operation of the circuit is described by using Fig. 29.

In Fig. 29, SFP and HD are supplied from IC8 within the Video P.C Board, and SFP is  $\frac{1}{160}$  of 160 fH oscillated by VCO (SYNC. FRONT PULSE) and outputted from IC8 (4), and HD is the input video signal sync-separated. The output terminal is IC8 (18). Therefore, when the video signal exists, HD and SFP are in fixed phase relationship, but in the case of noise, SFP is the one free oscillated by VCO, and VD receives the input of noise only.

Gates 3 and 4 are circuits to detect whether the HD phase (equivalent to sync phase) is in agreement with the phase of SFP.

When the video signal is correctly inputted into the video amplifier, 160 fH is locked by the input sync and has the same phase, and at that time, the output will be "L" at the point where the phases are in conformity as shown in (A). Since the time constant of the discharging direction of C324 of R366//D308 and C324 circuit is almost '0', (G) is made 'L' by the pulse. In the case of noise, it is very rare that the phases of SFP and noise are in conformity and that (A) becomes 'L', and the level is 'H'. Gate 2 and TR312 are the circuits to check that there is no noise in the part other than the sync. SFP is inverted by TR312, and the leading edge of waveform (C) is delayed by dt by C325. Therefore, it becomes 'H' when it is in the oblique line part of the waveform (C). If there is video input, the phases of (C) and HD are in agreement and (F) keeps 'H', but in the case of noise, it becomes 'L' when noise is inputted. In C323, R365 (charging circuit) and C323, R369 (discharging circuit), R365 >> R364, so the level of (D) is 'L' and output E is H. On the contrary, when there is video input, both (B) and (D) become 'H' and the output is 'L'. (See Fig. 30)

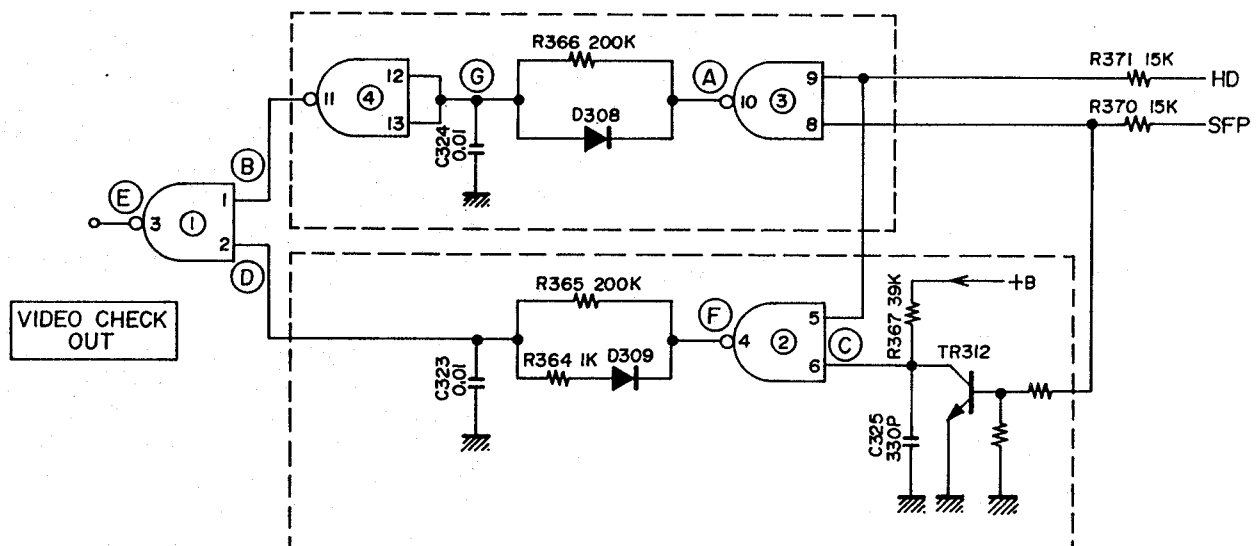


Fig. 29

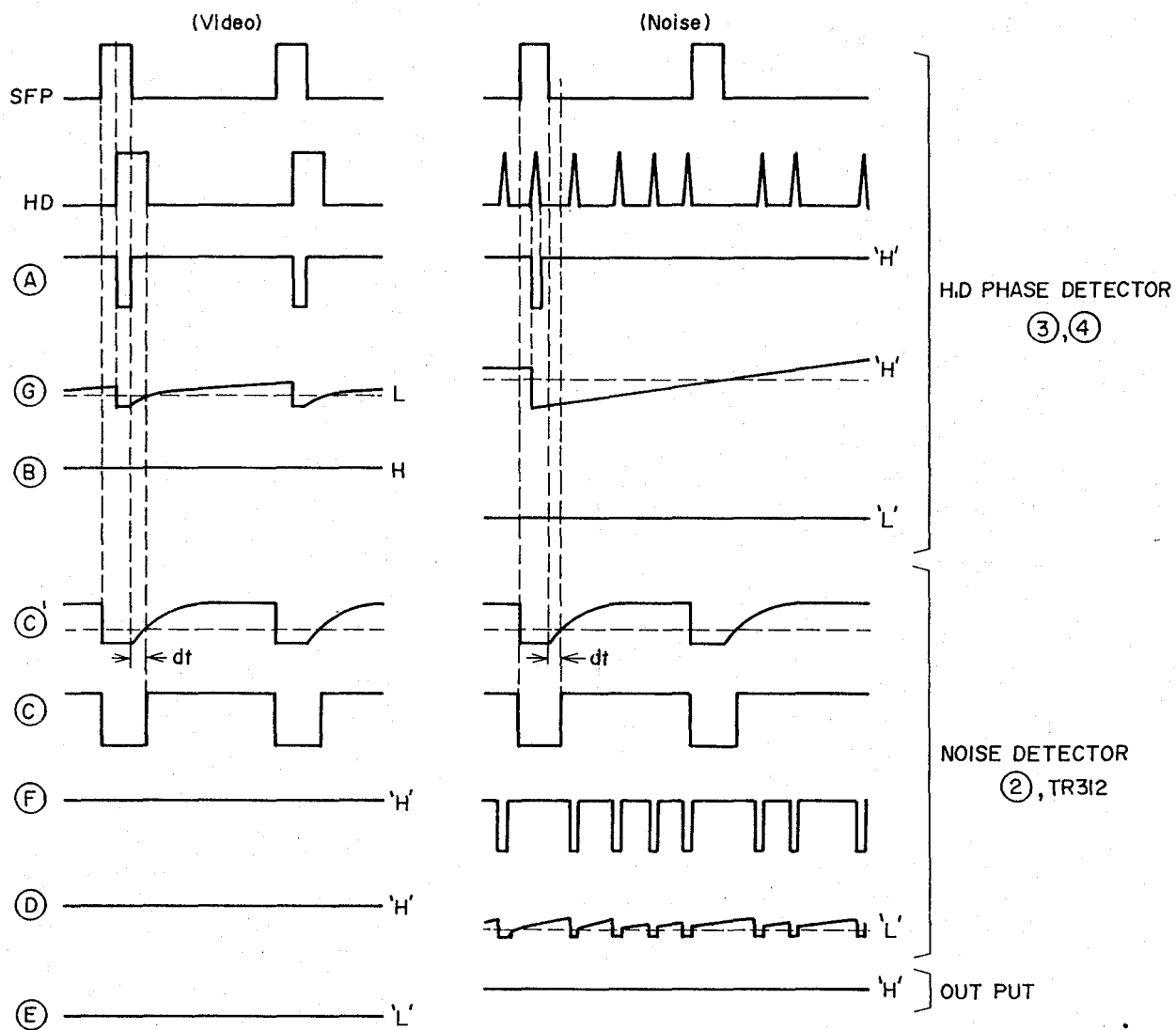


Fig. 30

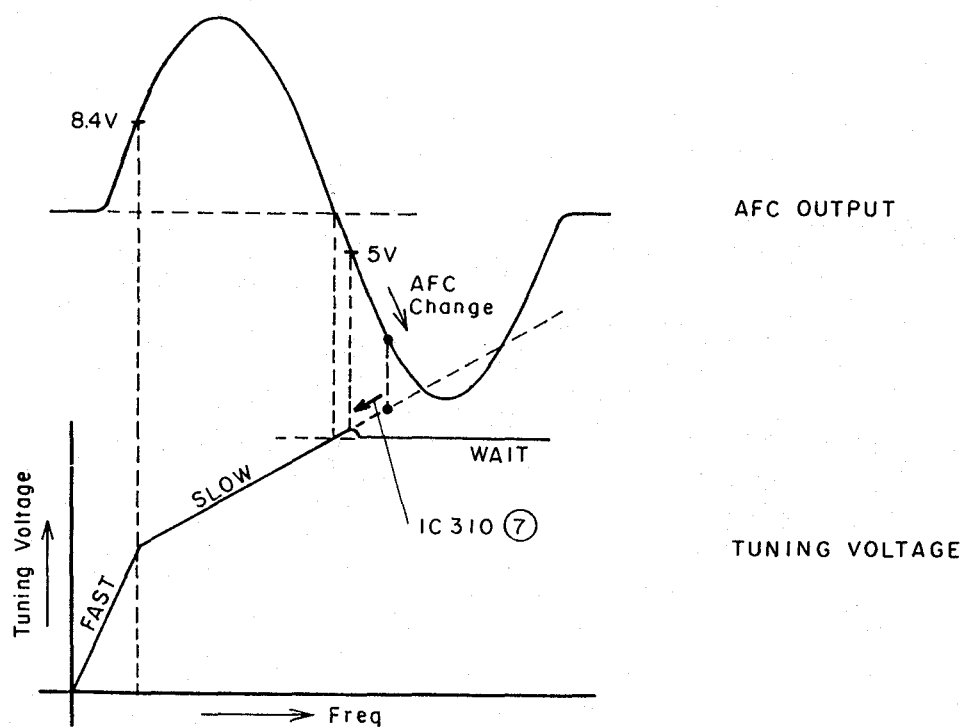


Fig. 31

- 11) Channel to be set is selected.
- 12) FINE is processed by 4 bits within the microcomputer and outputted from IC307 ⑨ ~ ⑫ as 4 bit output. This data are converted into DC by simple D/A converter IC312 and added to the tuner to make fine adjustment when a TV station is received. At this time, AFT is already operation, and the operation is described. When AFT is OFF, IC311 ⑧ - ⑨ is ON, so to the adder the voltage produced in IC312 ⑦ by the voltage differentiated by R346 and R345 is added. When AFT is ON, IC311 ⑧ - ⑨ is OFF, and conversely IC311 ⑩ - ⑪ is ON, and to the IC312 ⑦, the voltage produced in IC312 ⑦ by the signal from AFC is added. If AFC voltage is reduced and the frequency is increased due to the temperature change, etc., IC312 ⑦ rises and IC310 ⑧ falls and the frequency is reduced. (Fig. 31). FINE is to change the center frequency of AFC and about  $\pm 300$  kHz of change is possible by  $\pm 3V$ .
- 13) By pressing the SET (Memorize) key, the memory output order is inputted into IC307. By this order, addressing is carried out by 8 bits of IC307 ⑬ ~ ⑳ (fixed by set channel), and then, the aforementioned 16 bit data (VT: 8 bits, Fine 4 bits, Band 2 bits, Flag 1 bit) are outputted from IC307 ㉓ ~ ㉟, as one word = 4 bits, and stored in IC308.
- 14) If there is no key input for more than 20 sec. in the search-end mode, the tuner process is automatically finished.

### 3-1-3. Channel Select

The manual memory data reading and the memory data reading when timer recording are carried out by the function key or the timer instruction of IC307. If any one of these instructions is inputted, the address is specified, and the data stored in the address are outputted in 16 bits (one word = 4 bits) as in the above 13 from IC308 ⑩, ⑫, ⑭ and ⑯, and inputted into IC307 ⑨ ~ ⑫. On basis of this data, 8 bit VT output from IC307 ⑬ ~ ⑰, 4 bit FINE data output from ⑨ ~ ⑫, and 2 bit band output from ㉗ - ㉘ are outputted to the respective circuits.

### 3-1-4. Power Down Protection

#### 1) Power Down Detector

A power down detector circuit is provided to detect the power down immediately and to save the necessary data in the external memory while the microcomputer is able to operate. (Fig. 32)

If power down occurs at X point, IC313 ① becomes 'H', and the potential at (A) point is charged to the level shifted by D312 and TR313 ( $0.6 \times 2 = 1.2V$ ) but when the level at (C) passes the threshold level of TR313, (B) will be  $5V \rightarrow 'L'$ , and the power down detecting signal is issued. (Y point). Since the voltage of the capacitor in the power circuit starts decreasing at Z point, during the time  $t$  between Y and Z, power is supplied to IC307 from the capacitor. Since the power failure interruption occurs in IC307 due to the power down at Y point (IC307 ④ is the power down input), the necessary data are saved during this time  $t$  (completed in about 4 msec).

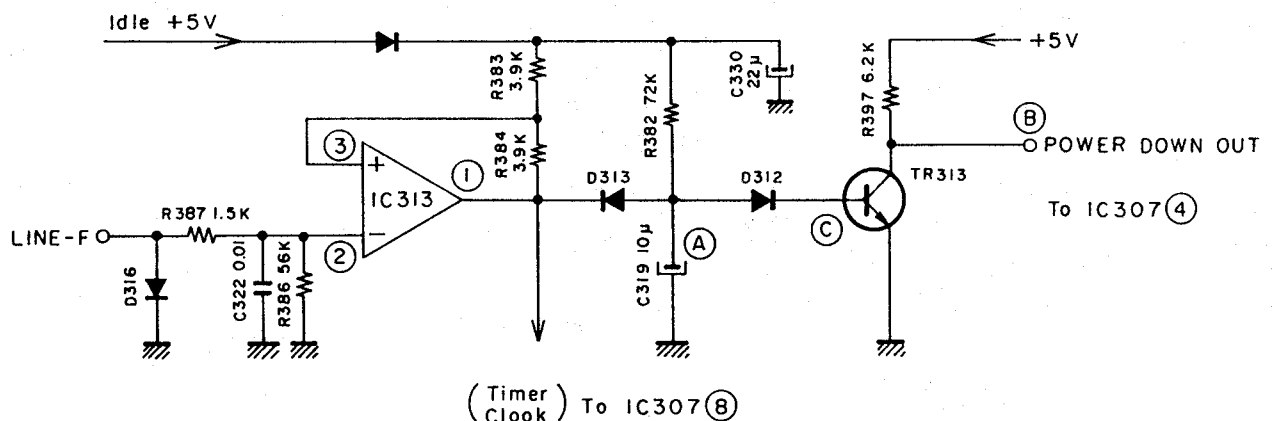


Fig. 32

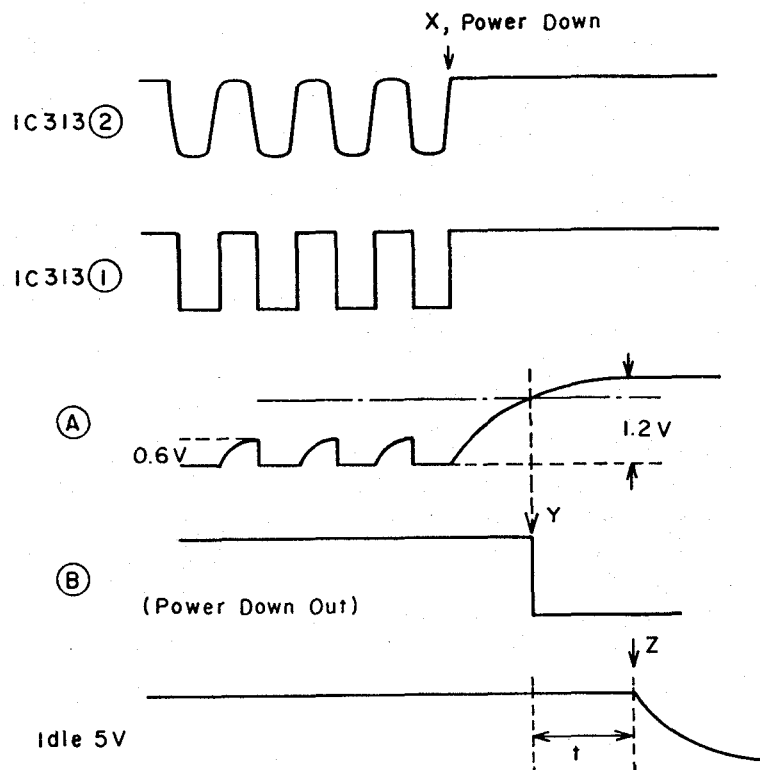


Fig. 33

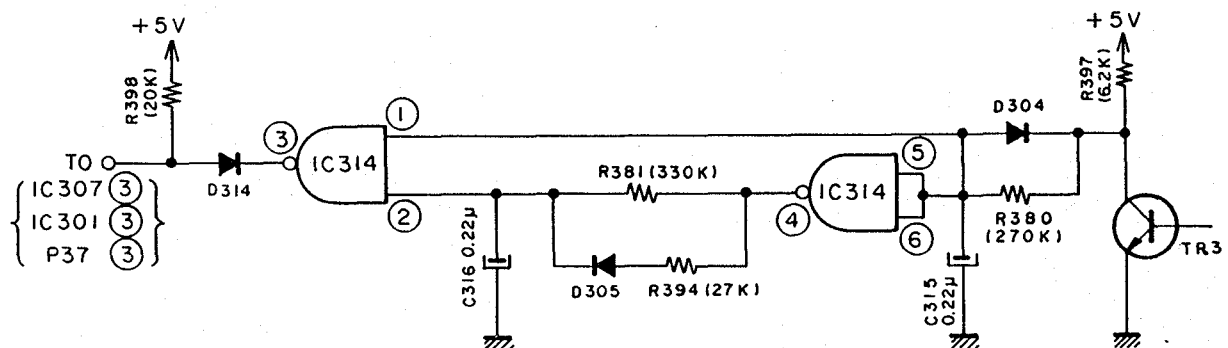


Fig. 34

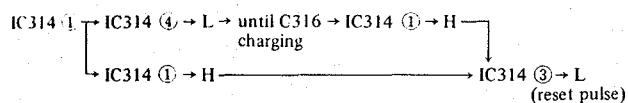
## 2) Reset Circuit

The microcomputers (IC307, etc) must be reset at the time of power up, otherwise, the program may start from an abnormal address.

This circuit uses IC314 2/4 which is backed up by batteries.

Until the voltage of C315 passes the threshold of IC314 ⑤ and ⑥ after power is turned ON, IC314 ⑤, ⑥ → L → IC314 ④ → H → C316 → charging → until C316 passes the threshold level of IC314 → 'L' → IC314 ③ → H.

If the voltage of C315 passes the threshold level of IC314 ③, ⑥ and



See Fig. 34 and Fig. 35.

When power down, TR313 is ON, so → IC314 ⑤, ⑥ / ① → 'L' → IC314 ③ → 'H'.

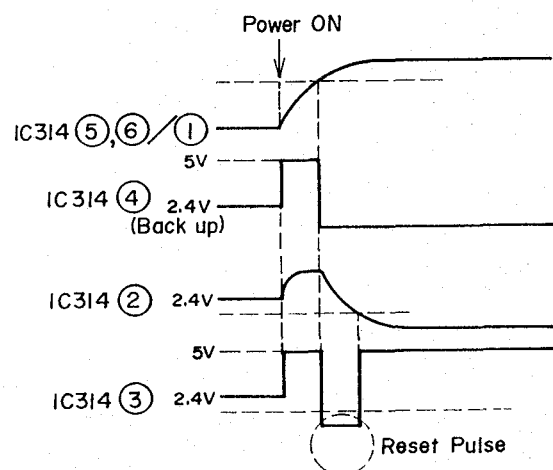


Fig. 35

### 3) Memory Erasure Prevention Circuit

Since the output of the microcomputers is disturbed by the voltage less than the specified voltage ( $5 \pm 0.5V$ ), a protective circuit must be provided in the external memory (IC308) directly connected to the TTC microcomputer (IC307), otherwise, the memory contents may be changed by the spikes which occur when power is turned ON or OFF.

Therefore, as shown in Fig. 36, RS-FF is made by using 2/4 IC314 to control the disable terminal of the external memory (IC308).

When power is ON, IC314 ③ → H → C318 → Charge up → IC314 ⑧ → H, then IC314 ⑪ → 'L', so the Disable of IC308 (memory) is released, and the Enable ('H') is added to the memory from IC307 ②⑤ to make the memory enable. In the case of power down, Power down detector out → 'L' → IC307 ④ → L → Microcomputer data saved → IC307 ②⑤ → L → IC314 ⑬ → L → IC314 ⑪ →

'H' → IC308 ⑲ → 'H' → IC308 disable, and the memory contents are protected.

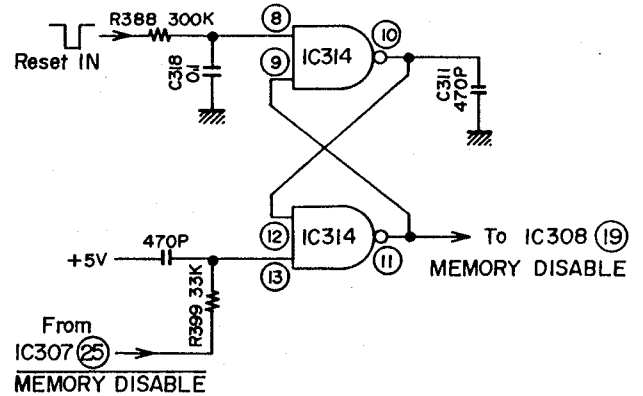


Fig. 36

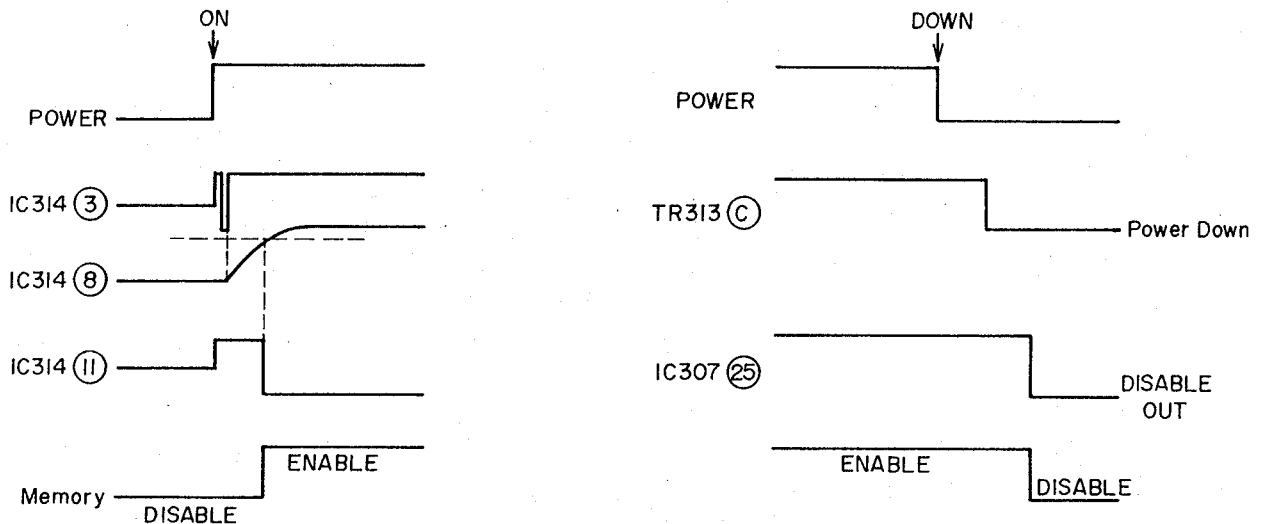


Fig. 37

### 4) Back Up

At a power failure, the external memory IC308 and IC314 (RS-FF) are backed up by Ni-Cd batteries. The reason the IC314 is backed up is that this IC controls the memory Enable/Disable of IC308.

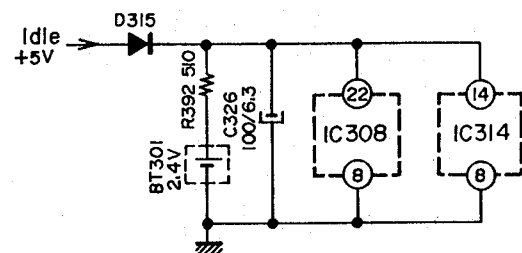


Fig. 38



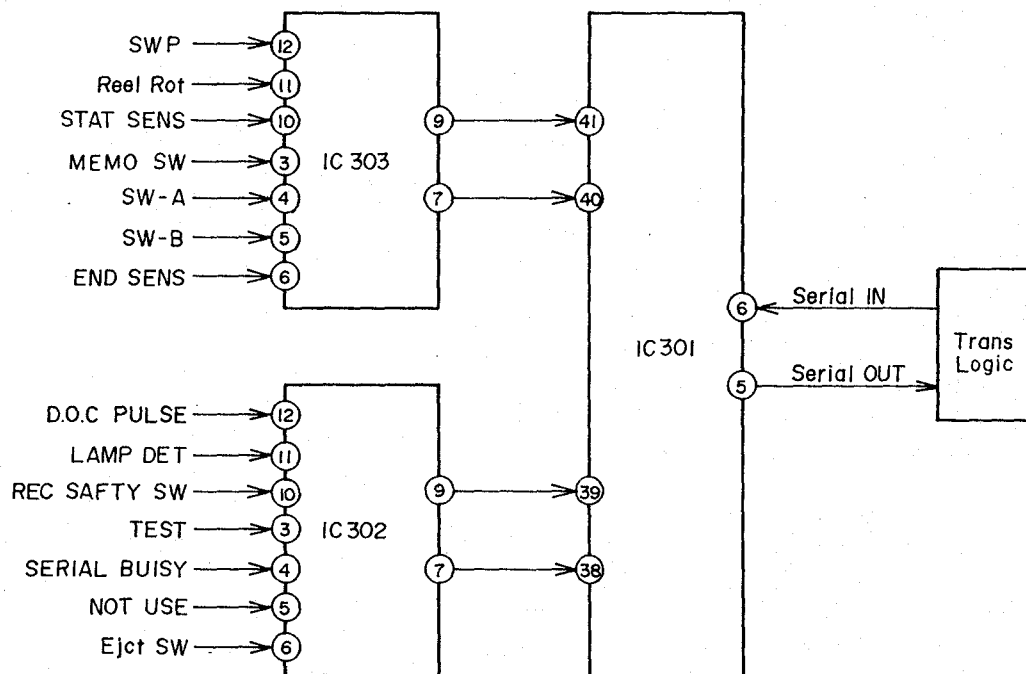


Fig. 39

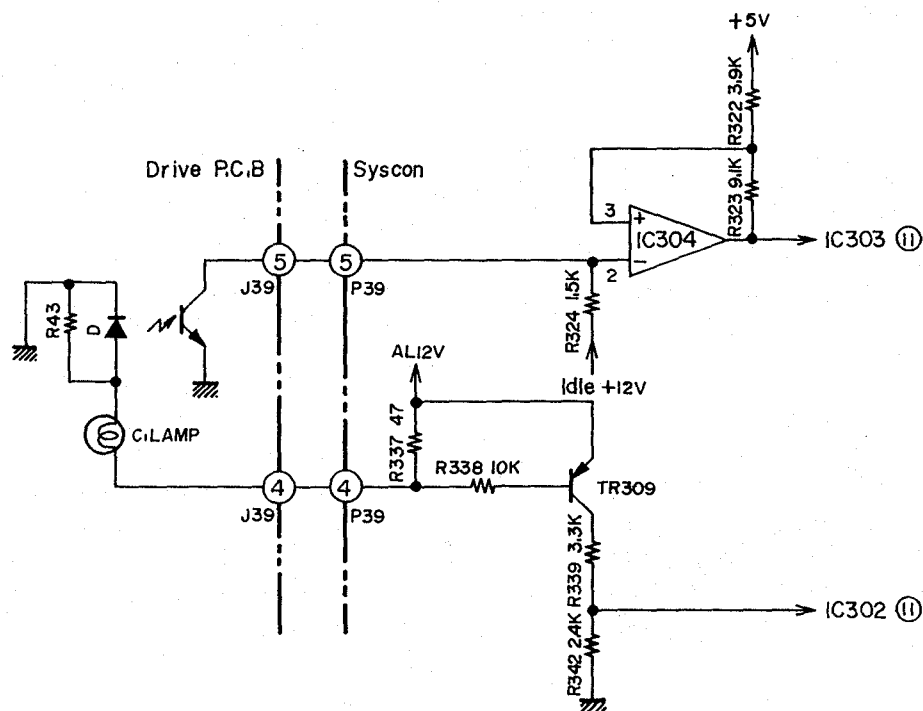


Fig. 40

### 3-2. System Control Circuit

The system control circuit consists of the micro-computer (IC301) for system control and two data selectors (IC302, IC303). Each mode data is inputted into IC301 as a serial signal through the transfer logic circuit, and all kinds of the warning data, as a parallel input of 16 bits (actually part of them is not used), divided into 8 bits each to IC302 and IC303 and then selected into 2 bits each by the same IC and is inputted into IC301 as 4 bit parallel signal.

#### 3-2-1. Reel Rotating Pulse and Lamp Detector

The lamp is lit through R337 (47 ohms) when AL+12 is issued after power is turned ON. If normal, TR309 'B' → L → TR309 → ON → IC302 ⑪ → 'H' but if the lamp is burned out or being burnt, TR309 'B' → H → TR309 → OFF → IC302 ⑪ → 'L' and the lamp abnormality is detected, then IC301 ⑳ → 'L' and the buzzer is sounded, and the data indicating the breakdown is sent to TTC through the serial out terminal (IC301 ⑤). If POWER ON button is pressed under

such circumstances, the buzzer sounds and power goes OFF.

The reel rotation is detected by the photo interrupter, and the LED is put in series with the lamp to utilize the lamp current effectively. R43 is a shunt resistance. IC304, R322 and R323 make a Schmitt circuit and the leading edge of the reel pulse is detected by the microcomputer (IC303). In the microcomputer program, the tape count mode is determined by this pulse. In the case of power OFF, stand-by or no cassette, regardless of the input, it will be minus during the tape loading, and in other cases, it will be plus or minus in accordance with the M-REV output (IC301 ③) produced within the microcomputer.

This pulse is also used to detect the reel stop. If there is no leading edge input within 1.7 sec. in FF or REW or within 2.1 sec. in PLAY, S-DUB, CUE and REVIEW, it is taken as real stop, and the buzzer is sounded and STOP mode is started. If there is any one leading edge within that time, the time is counted from the edge, and when the next edge does not come within the time shown in Fig. 41, it is taken as reel stop and as described above, the buzzer is sounded and STOP mode starts.

| Mode          | No Pulse Interval  |
|---------------|--------------------|
| FF or REW     | More than 0.12 sec |
| Cue or Review | More than 0.3 sec  |
| Normal Speed  | More than 1.3 sec  |

Fig. 41

### 3-2-2. Drum Motor Load Detection

Overload is detected by watching the interval of the leading edges of the switching pulse. If a leading edge does not come within 0.5 sec. after PAUSE mode

started, it is taken that the drum is not rotating and the buzzer is sounded and STOP mode starts. If any one leading edge is inputted within 0.5 sec., and if the next edge does not come within 0.1 sec. from the edge, it is judged that the drum load is too heavy, and the buzzer is sounded and STOP mode starts.

### 3-2-3. Loading and Unloading Detection

At the same time when the loading motor is turned ON and the loading cam start rotating, the next safety timer is set depending on the mode within the microcomputer.

|                             |          |
|-----------------------------|----------|
| Tape Loading and Unloading  | 4 sec.   |
| Idler Loading and Unloading | 1.7 sec. |
| Cassette Unloading          |          |

If the loading SWs 'A' and 'B' are not turned ON within the time, the microcomputer judges that there was some serious trouble, and indicates the breakdown immediately after 0.3 sec. and at the same time  $\overline{AL}$  output (IC301 ⑩) becomes 'H', TR303 is turned OFF, and AL + 12 becomes 'O'. Then, the TR of the power circuit is turned OFF, and the power is cut off. If the front POWER SW is turned ON under the breakdown caused by the loading or unloading trouble, another breakdown will occur except when the cassette unloading trouble is detected, and no reset is available.

Therefore, to release the breakdown due to the loading/unloading trouble, the POWER SW must be turned OFF once and then must be switched ON again. If the cause is not removed in such cases, the breakdown will occur continuously after 4.3 sec. (4 sec. + 0.3 sec.) or 2.0 sec. (1.7 sec. + 0.3 sec.).

## 3-3. Additional Circuits

### 3-3-1. Transfer Logic Circuit

Since VS-5 uses three microcomputers (Control, Syscon, TTC), it is necessary to transfer data among these three microcomputers. Therefore, the Control microcomputer takes the initiative to exchange data synchronously with TTC and Syscon.

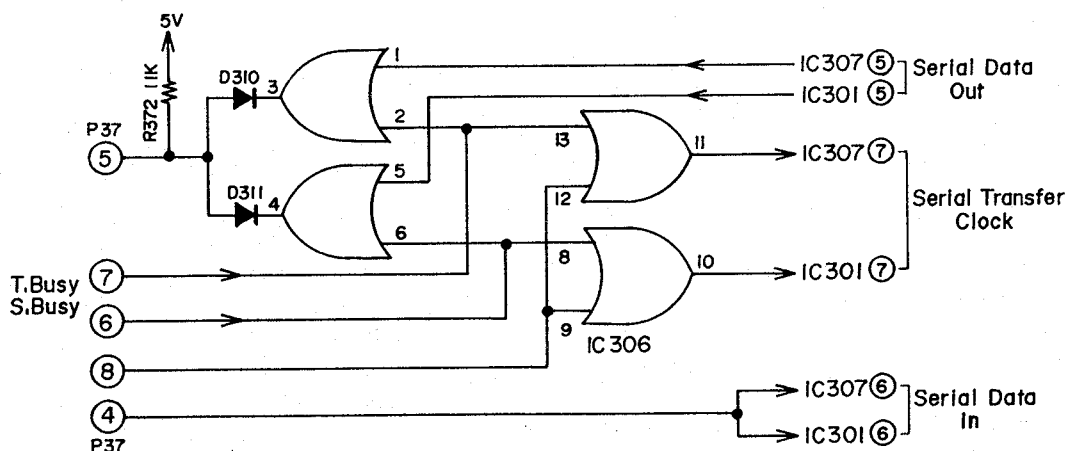


Fig. 42

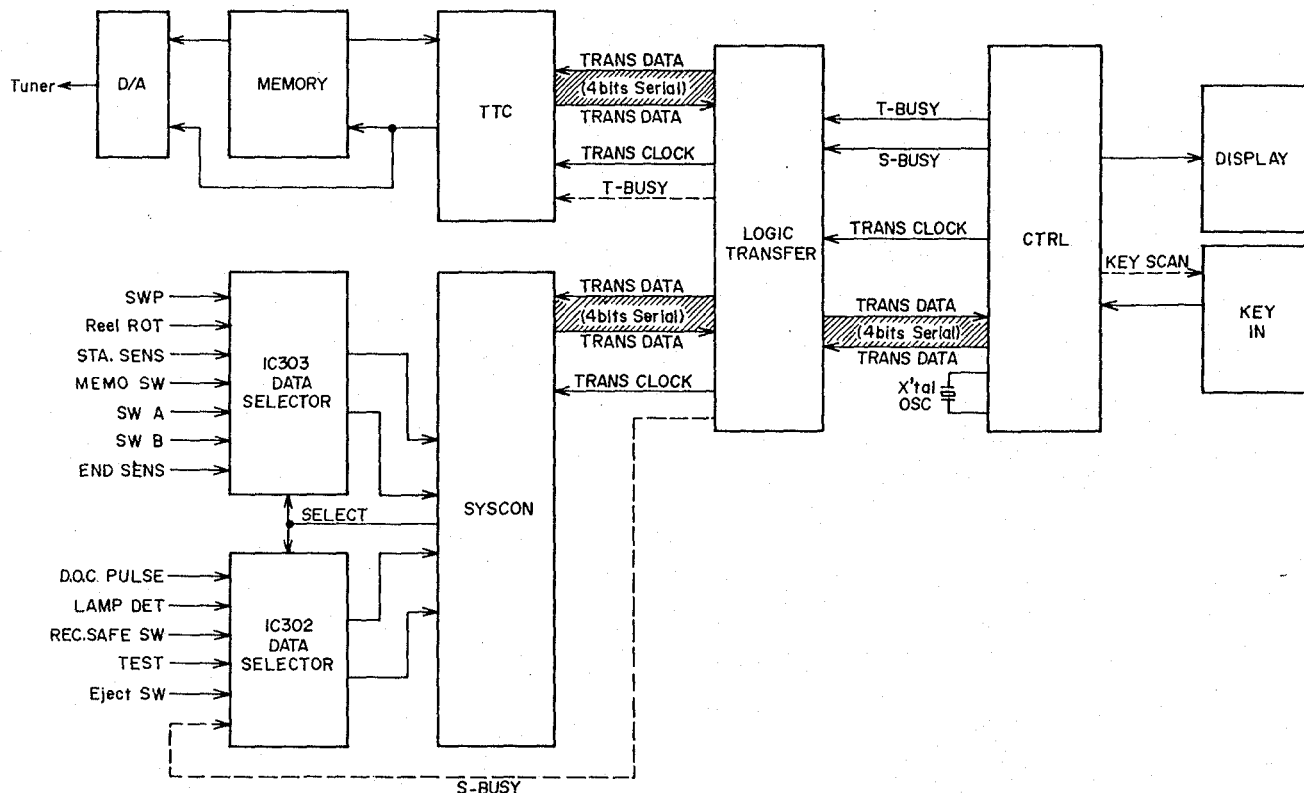


Fig. 43

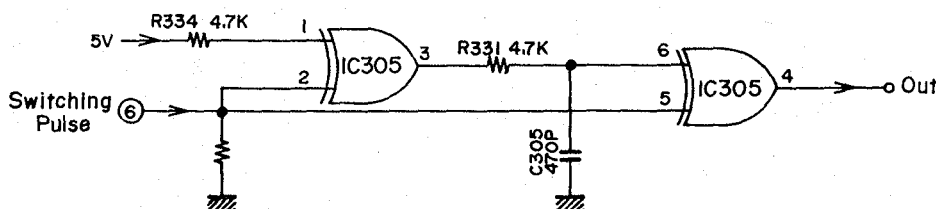


Fig. 44

In T-Busy cycle, IC306 ② / ⑬ becomes 'H' and IC306 ⑥ / ⑧ becomes 'L', and data is inputted into IC301 ⑦, and the data from IC301 ⑤ is inputted into IC306 ⑤ and outputted from IC306 ④. TTC/Syscon/CTRL signal block diagram is shown in Fig. 43.

| A | B | Q |
|---|---|---|
| H | H | L |
| H | L | H |
| L | H | H |
| L | L | L |

EX-OR TRUTH TABLE

### 3-3-2. Pseudo V Pulse Generation (Equalizing Pulse)

In STILL, 50 Hz is made synchronizing with the edge of the switching pulse to prevent the picture deviation which is caused by the existence of 1.5H difference per field. This is executed by the program of the microcomputer. See Figs. 44 to 46.

Fig. 45

### 3-3-3. Buzzer Circuit

Syscon microcomputer (IC301) ⑬ → L → IC305 OSC → Oscillation or the buzzer can be driven directly by the microcomputer because piezoelectric type is used.

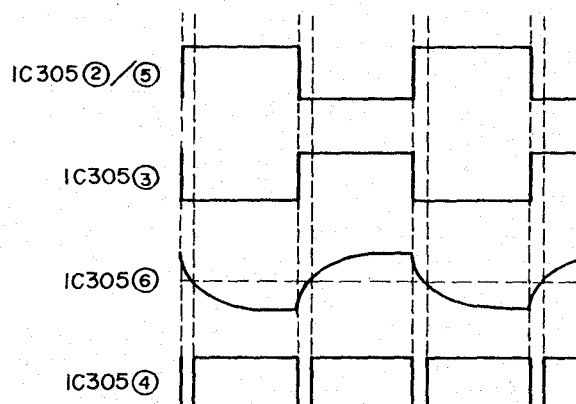


Fig. 46

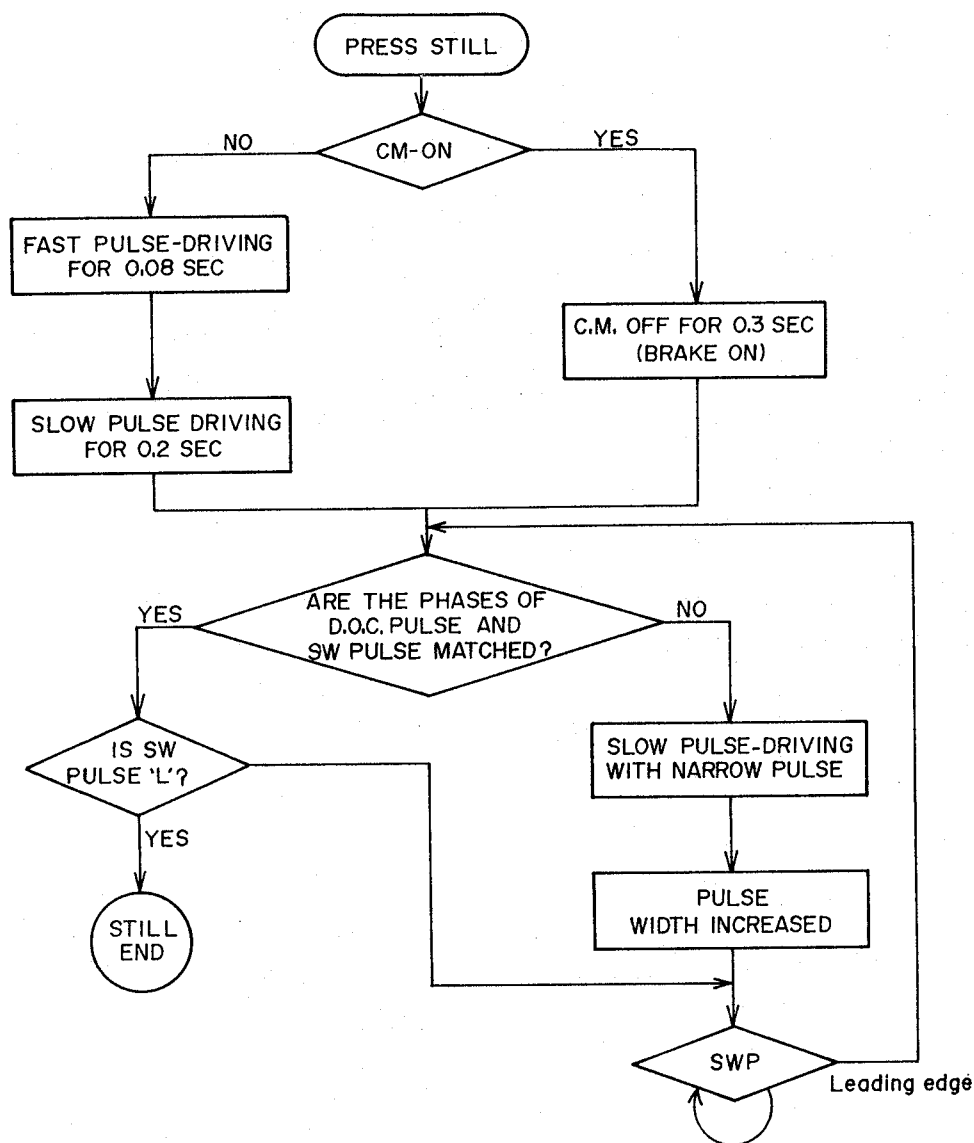


Fig. 47

### 3-3-4. STILL Control

VS-5 obtains the still picture by pulse-driving the capstan motor (C.M.) thus feeding the tape little by little and by comparing the phases of the DOC-Pulse made by the video circuit and of the drum FF in accordance with the program of the following (Fig. 47) within the IC301. The pulse-driving pulse is triggered by the up-edge of the drum FF (switching pulse).

Therefore, the synchronization is 25 Hz. When the STILL key is pressed, check is made to see whether the CM is operating and if it is operating, brake is applied for 0.3 sec. to bring it almost to the stop.

If the CM is not operating, it is taken as frame advance, and the tape is pulse-driven fast for the first 0.08 sec. and a little slower for the next 0.2 sec. to shorten the reverse channel playback.

Then, check is made of the phases of the DOC pulse and the switching pulse, and if the leading edge of the SW pulse matches the phase of the DOC, the still status is achieved. If they are not matched, resetting is made and the tape is fed slowly being pulse-driven

with slow pulse length.

Even if the phase are matched, the work should not be stopped so soon because it will go too far if the tape speed is not sufficiently slow. Therefore, check must be made to confirm that the speed is sufficiently slow and when the phases are matched 5 times, the STILL is finished.

If the phases are not continuously matched 5 times, the pulse-driving is continued slowly until 5 time matching of the phases is achieved. However, despite the fact that the slow driving is possible under the normal temperature, it may happen that the pulse does not move so smoothly under the low temperature. Therefore, each time they are not matched, the pulse width is increased a little. In this way, VS-5 uses the microcomputer to achieve STILL, and consequently no adjustment is possible after the picture is actually stopped. But from many experimental results, the best value is set so that there will be no problem. Therefore, in such cases, it is necessary to check whether the operation of the driving system is correctly being carried out.

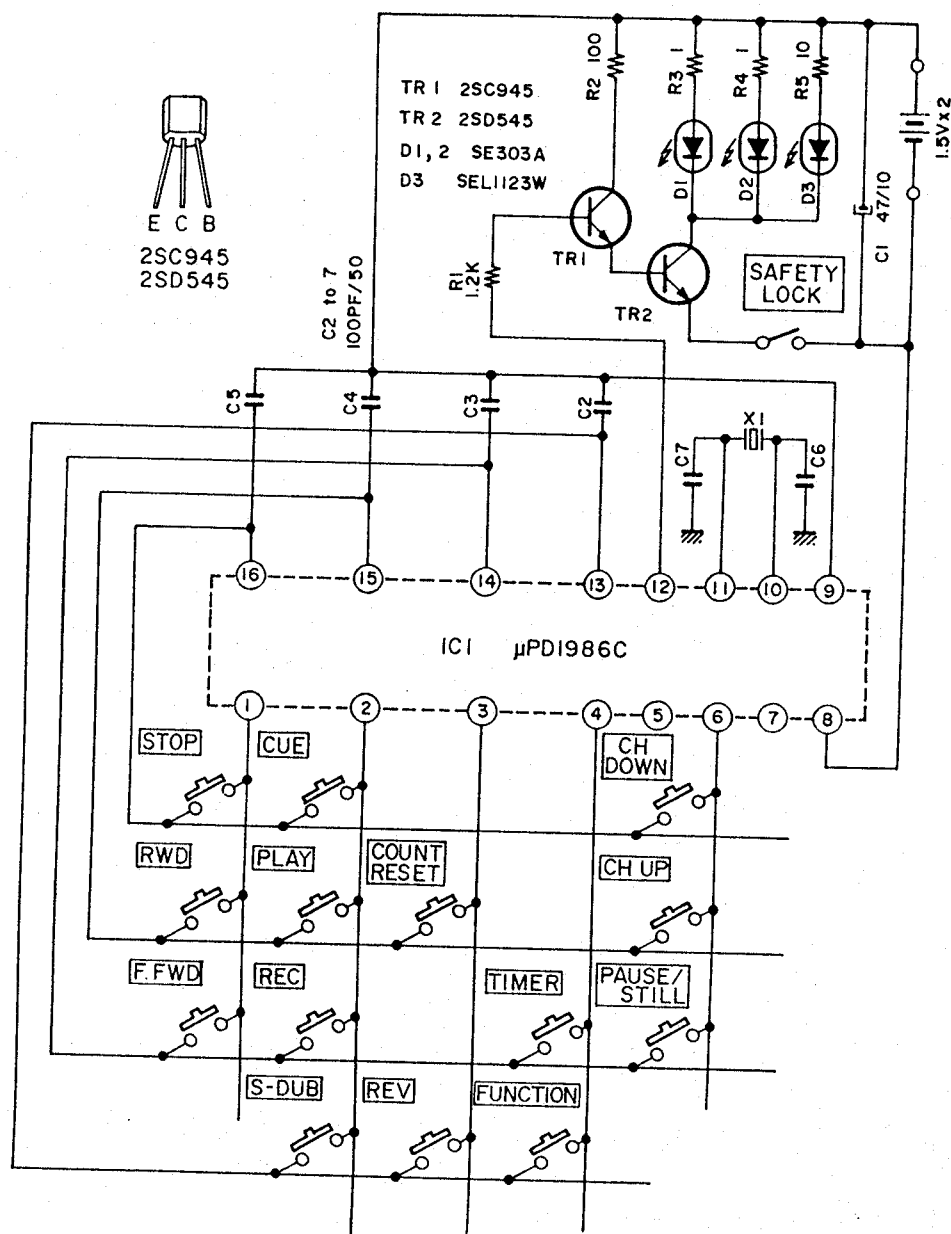


Fig. 48

### 3-4. Remote Control Unit

Infrared-ray IC MPD1986C is used. The carrier is 38 kHz. While the keys, CHANNEL UP, CHANNEL DOWN and PAUSE/STILL are pressed, the pulses as shown in Fig. 49 are transmitted continuously at the interval of 36 msec.

Other keys do not work after the signal is issued twice, thus saving the battery. To prevent the unnecessary transmission, the power SW is provided at the side.

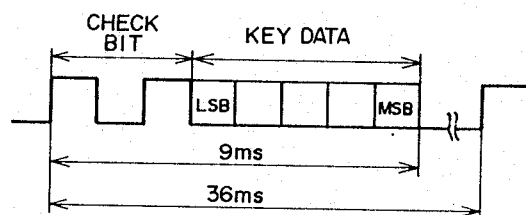


Fig. 49

## 4. VIDEO AMPLIFIER CIRCUIT

### 4-1. Y Signal System

#### 4-1-1. Recording Circuit

##### 1) 5 MHz LPF (LCB-51)

The input video signal is terminated by 75 ohms within the rear substrate and enters 5M LPF LCB-51. The LPF is to correct the phase distortion of Y and chroma of the recording system and delays the Y signal by 0.2 msec. using a LPF of 5 MHz. Fig. 51 shows the delay time relationship of the filters.

##### 2) AGC (AN6310)

The video signal passing the 5 MHz LPF enters AGC of AN6310.

One of the reasons AN6310 is used for the IC of recording system instead of HA11701 (VS-9700) is its superior AGC characteristic. Both ICs are keyed + peak type AGC but there is a considerable difference between them in input and output characteristic (Fig. 52), i.e. the AGC characteristic of HA11701 was that a constant level could not be obtained at the time of excessive input and for the signal with high luminance such as VIT signal

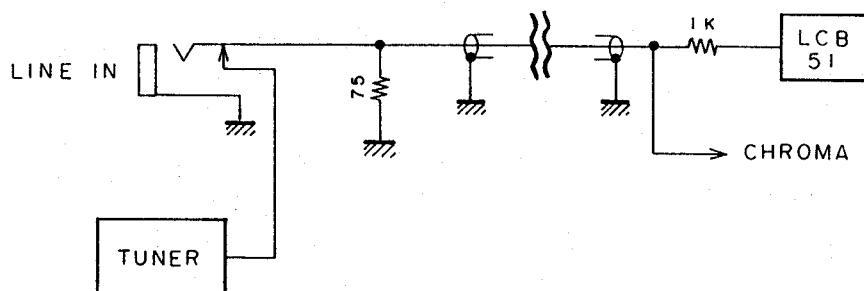


Fig. 50

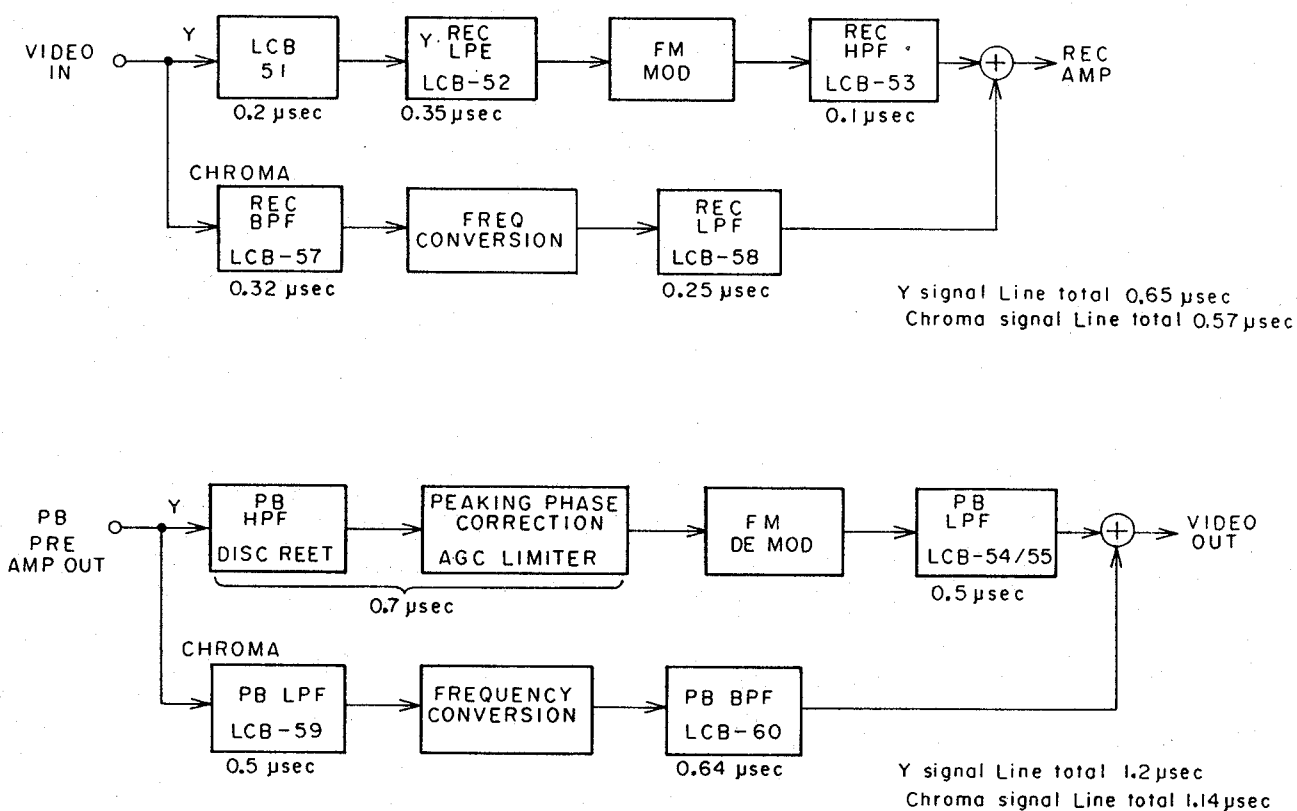


Fig. 51

(recognizing signal in V blanking), the level could not be sufficiently controlled and buzz was produced. On the other hand, in case of the AGC characteristic of AN6310, the level is sufficiently controlled as shown in Fig. 52, and even when such a signal enters, no excessive input will go into the RF converter and buzz will not be produced so easily.

The keyed + peak AGC means that when the peak-to-peak is within a certain size, AGC works so as to keep the size of SYNC constant and when the peak-to-peak reaches a certain level, it works so as to keep the entire level constant. The VIT signal is the signal put into the V blanking immediately after the V SYNC by TV stations, etc., to compensate and recognize the characteristic of the transmitting system, but there is a large APL fluctuation after the V SYNC and it seems that some stations have excessively large VIT signals and they are one of the causes for buzz. (VS-9700).

Also, it seems that some stations input a static picture called teletext also immediately after the V SYNC in addition to the VIT signal and that the SYNC ratio of the video signal varies widely depending on the stations, and these also produce buzz. If AN6310 (improved version of AN6300) as the AGC, the peak does not exceed a certain level and the buzz problem is solved. In case of the AGC output level, the gain is changed by VR1 (20K) to control the E-E level. The AGC time constant is determined by C and R of Pin ④.

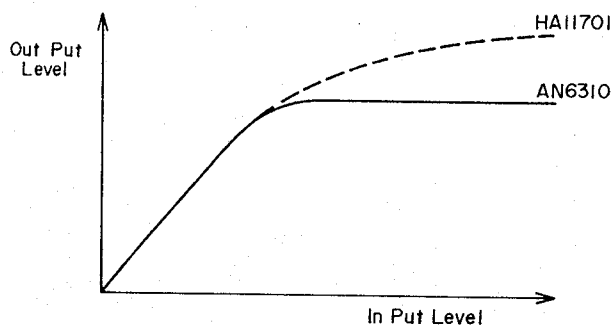


Fig. 52

### 3) REC Y LPF (LCB-52)

The signal from AGC partially enters HA11703 as E-E, and is outputted to VIDEO OUT by E-E and PB switching. Fig. 53 shows the characteristic of LCB-52. The signal from the AGC enters REC-Y-LPF LCB-52 and the chroma signal of 4.43 MHz is removed. Since VS-5 does not change the band by color and B/W, the signal always passes this filter. Therefore, Pin ② (Color-B/W change-over) of AN6310 is connected to Vcc and no change-over is made. Phase characteristic is improved because REC and PB are not using a same LPF.

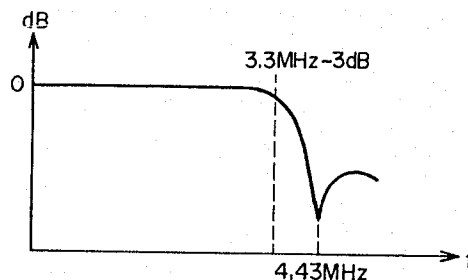


Fig. 53

### 4) Non-linear Emphasis

After the LPF, the signal enters the non-linear emphasis.

The non-linear emphasis is more effective for the signal with smaller amplitude, and if this process is made when recording, S/N and modulation factor will be improved when regenerating. As shown in Fig. 54, it uses the characteristic of diode, and if the level is large, the diode is turned ON and no emphasis is applied by the time constant of C1 R1 and C2 R2 and if the level is small, D1 and D2 are OFF, and by the time constant of C1, R1 and R2, emphasis is applied. Therefore, the frequency characteristic of the signal with smaller level can be reduced that much, and the S/N of the flat part can be improved. If the frequency characteristic is left as it is when regenerating, the modulation factor will be increased to the extent that emphasis was applied when recording. VS-5 has the emphasis of 3 ~ 4 dB for the signal of -20 dB. (Fig. 55)

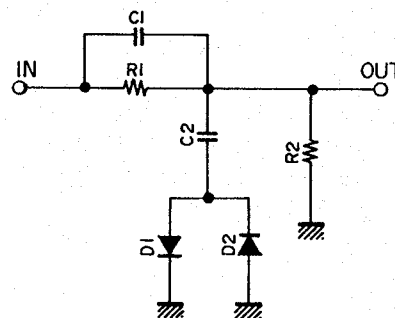


Fig. 54

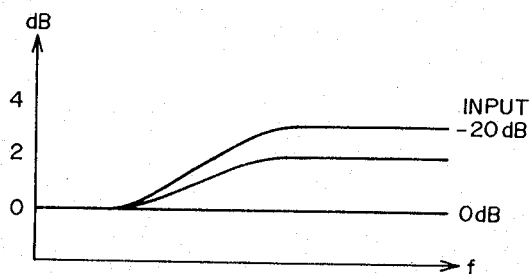


Fig. 55

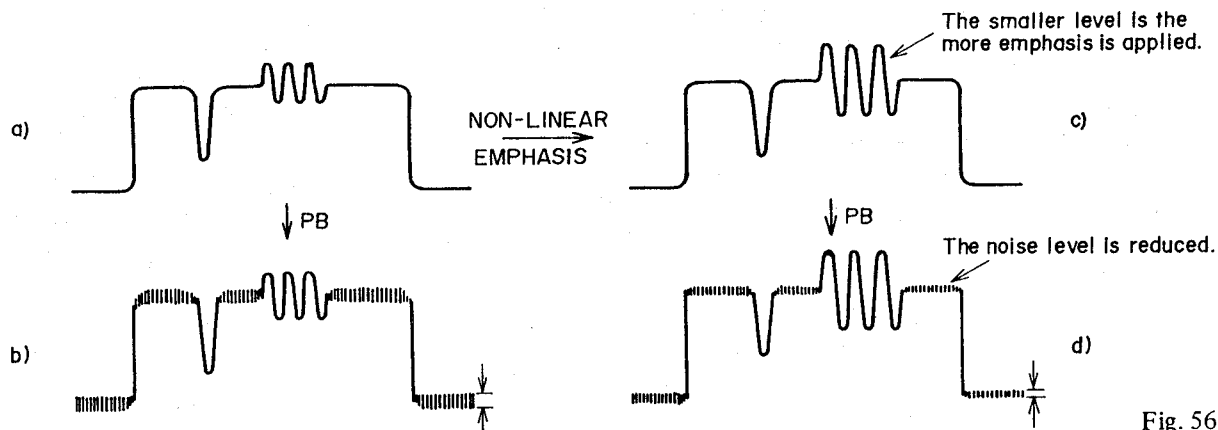


Fig. 56

For the actual waveform, the S/N can be improved as shown in Fig. 56.

On voltage of the diode is 0.2 to 0.3V (1SS16), so the input of the nonlinear emphasis is about 2 Vp-p. Since the chroma signal which was not removed by the REC LPF because the emphasis was on or the chroma signal leaking due to the pattern is leveled up, a trap (27pF, 27μH) is provided to eliminate it.

##### 5) CLAMP, PRE-EMPHASIS, DARK CLIP, WHITE CLIP

After the non-linear emphasis, the signal passes Clamp, Pre-emphasis and Clip and enters FM modulator. The clamp is to make the carrier frequency of SYNC TIP constant. Then, the ordinary pre-emphasis is applied. This curve is stipulated by the VHS specification and is shown in Fig. 57. This is determined by C and R connected to Pin ⑪ of AN6310.

Then dark clip and white clip are applied. This clip circuit is called soft clip circuit. By this method, the waveform is clipped as if it were crushed from the top as shown in Fig. 58. Fig. 59 shows the circuit.

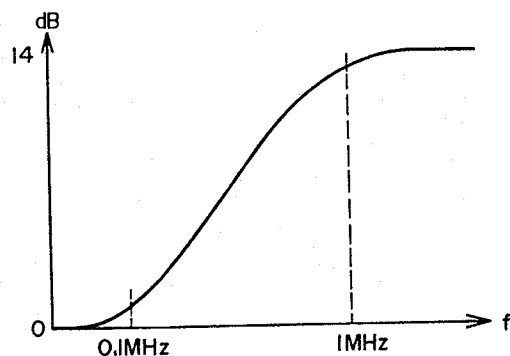


Fig. 57

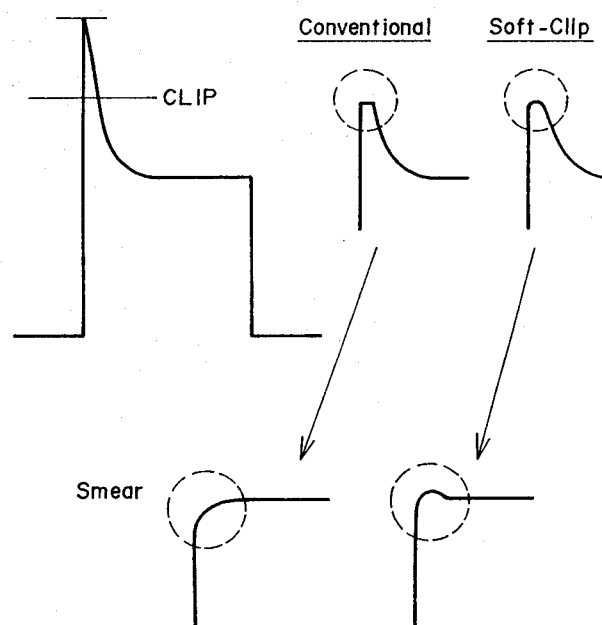


Fig. 58

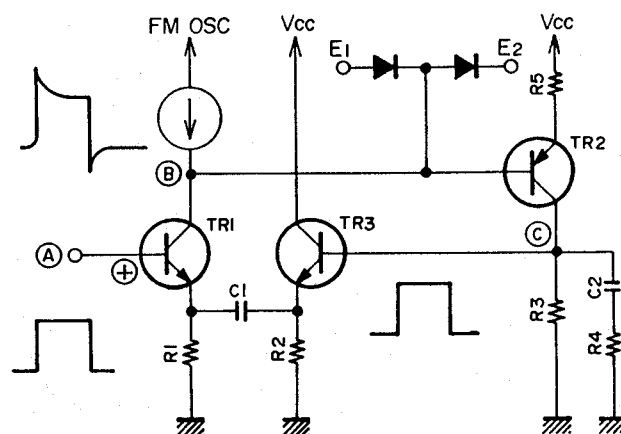


Fig. 59

a) Q1, Q2 and Q3 set up a differential amplifier. The constant-current source of collector load of Q1 is FM OSC and the frequency changes in proportion to the collector current of Q1.



b) If ① is inputted to  $\oplus$  of the amplifier, the output ③ is negatively fed back to the base of  $\ominus$  input Q3.

R3, R4 and C2 set up a de-emphasis.

c) As a result, at FM OSC (collector of Q1), the pre-emphasized waveform which will be the same waveform as that of the input ① when the de-emphasis is transmitted, is produced.

d) The waveform preemphasized by the voltage of E1 and E2 is clipped. But for the same reason as given in ③, the waveform is so clipped that it will become approximately the same as the input waveform when de-emphasized.

e) As a result, the smear due to clipping is improved.

The clip level is determined by VR3 (white clip) and VR4 (dark clip) and is adjusted to 160% and -40% respectively.

#### 6) FM Modulator

The signal is modulated into FM by the FM modulator within AN6310. The oscillation frequency is determined by the capacity  $75\text{p} (68\text{p} + 7\text{p}) + \alpha$  (trimmer) or Pins ⑬ and ⑭, and is set at 3.8 MHz by SYNC TIP.

#### 7) REC Y HPF (LCB-53)

The FM signal enters HPF (LCB-53) to eliminate the interference with the chroma. It always passes this filter because there is no Color-B/W change-over. The cut-off frequency is 1.4 MHz.

This is received by EF and sent to REC AMP.

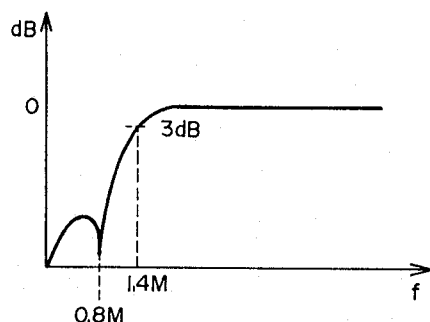


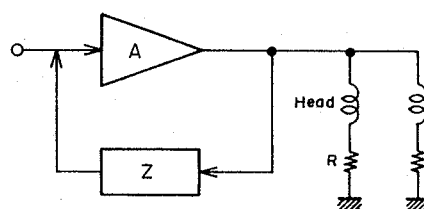
Fig. 60

#### 8) REC AMP

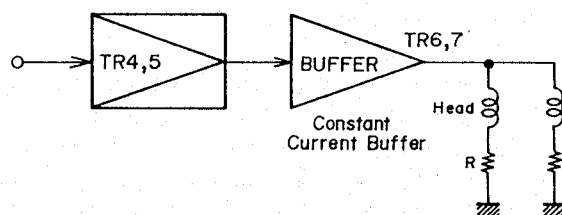
As shown in Fig. 61 (a), the REC AMP of VS-9700 determines the REC AMP frequency characteristic (VHS specification) by applying the feedback Z to

the Gain -A amplifier, and the output is constant-voltage driven.

On the other hand, the REC AMP of VS-5 determines the frequency characteristic with the preceding amplifier (TR4, 5) and after that, it provides the constant-current buffer (TR6, 7) and the output is constant-current driven. The advantage of the constant-current type is that the current does not change even if the inductance of the head changes a little. For example, in the case of constant-voltage type, if the inductance has changed due to the wear or time aging of the head, the current will be changed in proportion to the inductance thus changing the recording current, but in the case of the constant-current type, the current will remain constant even if the inductance is changed thus assuring the constant recording current. Also, the frequency characteristic of REC AMP is determined by C29 (7p), C28 (11p) and R31 (1.5K). (Fig. 62). Fig. 63 shows the recording signal mixer section, and the FM signal of Y and chroma signal (low band conversion 627 kHz) are mixed before the REC AMP. The power supply of the REC AMP is controlled by the signal REC MUTE as shown in Fig. 64. This is to prevent the recording current because the regenerating mode is provided once when AEC (electronic editing).



a) Conventional Rec Amp



b) VS-5 Rec Amp

Fig. 61

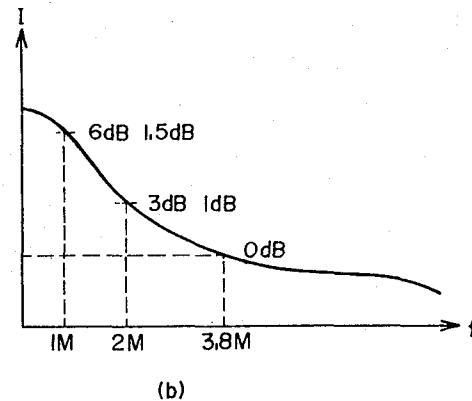
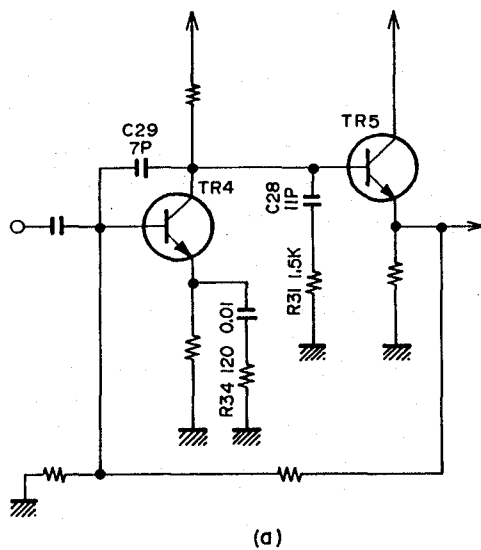


Fig. 62

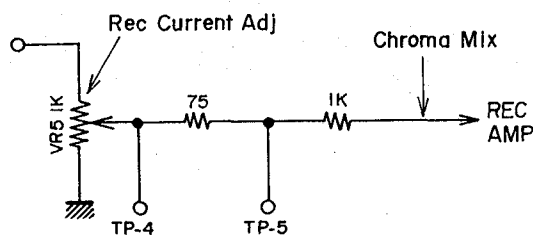


Fig. 63

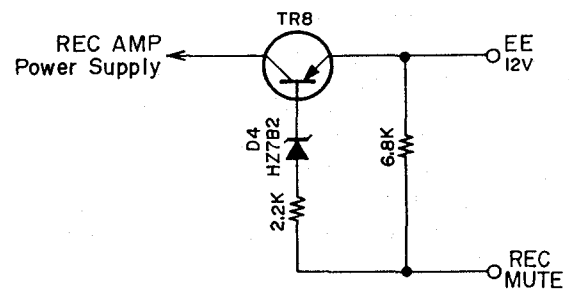


Fig. 64

#### 4-1-2. Y Signal Play Back Circuit

##### 1) Pre Amplifier

For the matching with the head, the peaking frequency (4.5 MHz) is adjusted by the trimmer condensers VC 2 and 3 and the damping (4.5M/1M:1.8) by VR6 and VR7. VS-9700 applies the peaking of LCR at Pins ⑧ and ⑭ of AN6320N, but VS-5 has a peaking circuit at a later stage and it has not peaking in here.

The output of the pre amplifier is made at EF when CH1 and CH2 are switched. It has no such PB FM balance as provided in VS-9700 but instead, it used AGC HA11718 to eliminate this adjustment.

The output of the pre amplifier is outputted by the connector at TP6 as FM envelope.

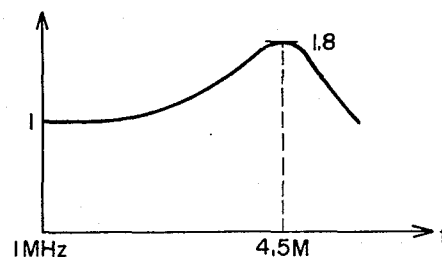


Fig. 65

##### 2) HPF, PEAKING, PHASE COMPENSATION

HPF is provided discrete and the characteristic is shown in Fig. 66.

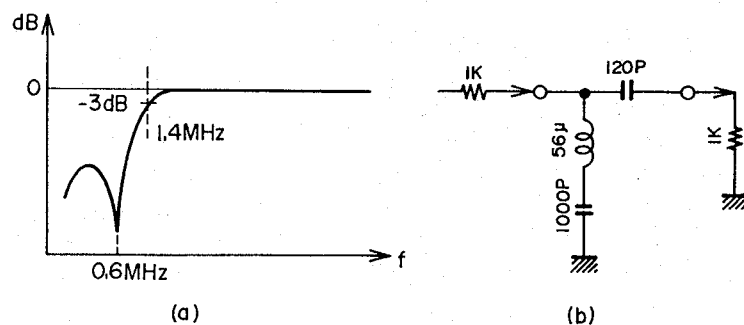


Fig. 66

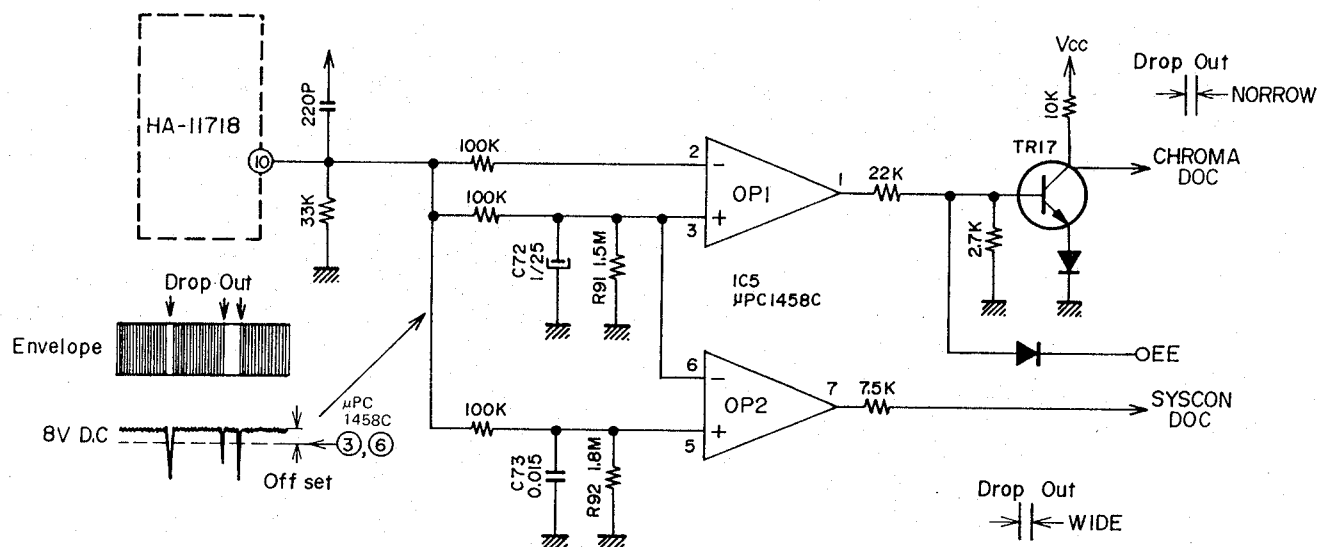


Fig. 67

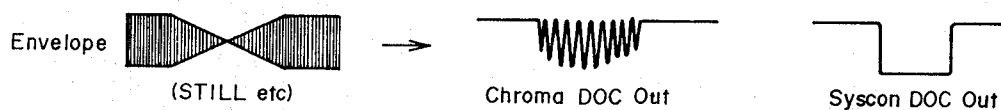


Fig. 68

After the HPF, peaking is applied by TR13 nearly to 5.5 MHz. The resonance with the head and the peaking at a later stage amount to the total peaking of about 4 times.

### 3) AGC, DOC

Due to the provision of PB system AGC, FM balance at PB is not required. HA11718 includes pre amplifier, AGC and DOC, but the pre amplifier and AGC, if used simultaneously, may interfere each other in PAL band, and also there are many use problems such as oscillation, and therefore, AGC and DOC only are used and for the head amplifier, AN6320N is used. DOC detection sensitivity is changed by the resistance R85 (3.3K) of Pin (9).

### 4) DOC Pulse

The chroma circuit of VS-5 is designed not to gate AFC and burst when there is a drop-out in the function of AN6362. For this reason, DOC pulse is required. Also, when STILL, the microcomputer sends the noise bar to the lower part of the picture by using the DOC pulse.

At Pin (10) of HA11718 there appear waveforms as shown in Fig. 67, in proportion to the drop-outs. From these the DOC pulse is made with the use of an operational amplifier (μPC 1458C). To eliminate the dispersion of the DOC pulse (it is necessary to adjust by means of VR to restrict the dispersion) due to the dispersion of the DC voltage of PIN (10), the output of Pin (10) is smoothed to be a reference voltage and compared by 1458 to produce

the pulse. For this reason the DOC pulse is not adjusted. R91 is for offsetting the reference voltage and so designed that the pulses are prevented from occurring unnecessarily. Unlike the DOC for chroma, the DOC pulse to be sent to SYSCON must be relatively wide, and therefore, it is rounded by C73. R92, also for offsetting, determines the output amount of the SYSCON DOC pulse. (Fig. 68).

The diode provided in the emitter, base of TR17 of chroma DOC is intended to prevent the DOC pulse from going to the chroma circuit under EE condition.

#### 5) Double Limiter (1st Limiter)

The short wave length recording of PAL needs a double limiter to prevent the over modulation. The circuit consists of a high pass amplifier and a diode limiter. (Figs. 69, 70)

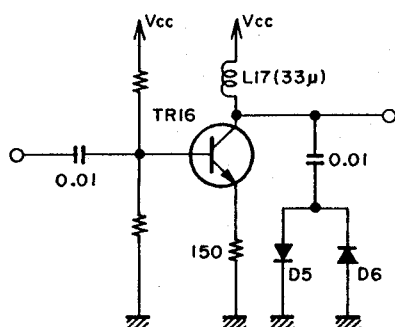


Fig. 69

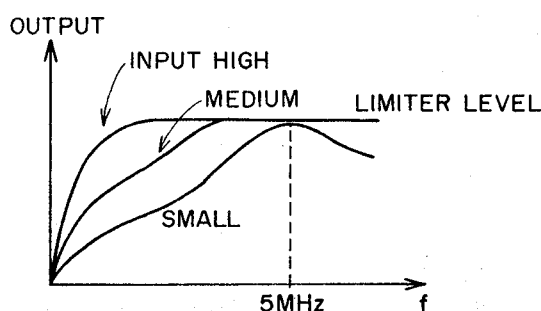


Fig. 70

#### 6) PB Y LPF (LCB54, 55)

The characteristic of LCB54 and 55 is shown in Fig. 71, and they have the total delay time of 0.5 msec.

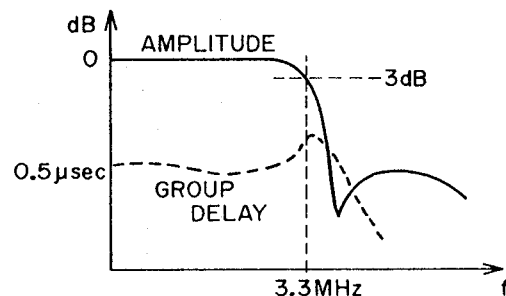


Fig. 71

#### 7) De-emphasis

De-emphasis is the circuit shown in Fig. 72 and TR18 sets up the amplifier to determine PB Y level and the peaking through C84, L23 and R102. The de-emphasis consists of R104, R105 and C85//C86.

The peaking of C84, L23 and R102 is to increase the percentage modulation and raises about 2.3 MHz. This makes the video frequency characteristic in recording and regenerating almost flat.

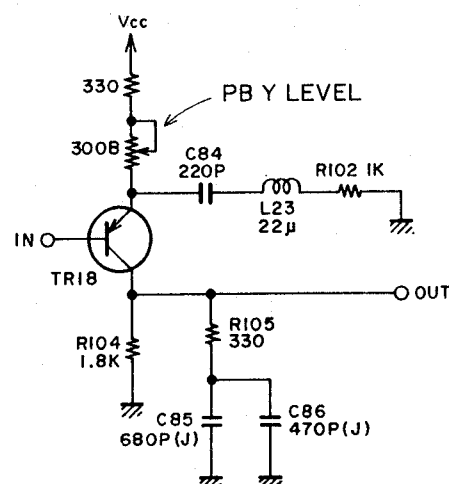


Fig. 72

#### 8) Noise-Cancel

The noise cancel is shown in Fig. 73, and the regenerative video signal enters ⑫, and the one with the high part removed by R115 and C93 enters ⑪. After taking the difference between ⑫ and ⑪, those processed by the limiter are outputted to ⑬. Therefore, here come out the small level components in high band, especially those

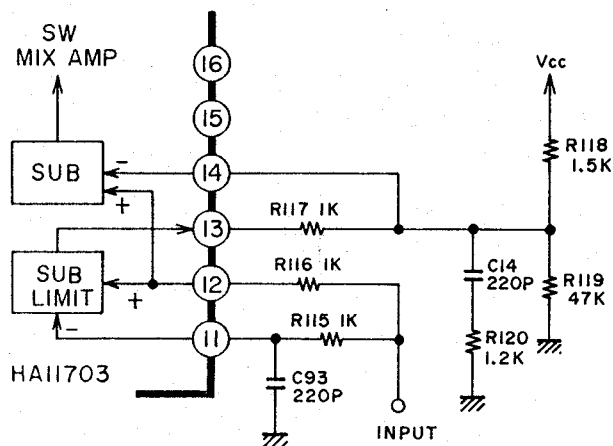


Fig. 73

containing much noise. (large level high band components are processed by the limiter and the amplitude is controlled). These are corrected slightly by the filter of R120, inputted in ⑪ and withdrawn from the input signal of ⑫. Thus the noise components only of the regenerative video signal are removed and the S/N is improved. The filters of C94 and R120 are to cancel noise components only and not to cancel the high band too much.

#### 9) MIX, V. PULSE INSERTION, SW (EE/PB)

The video signal passing the noise cancel is mixed with the regenerative chroma signal ⑮ by HA11703 and switched to EE or PB by an electronic switch. This change-over is controlled by the

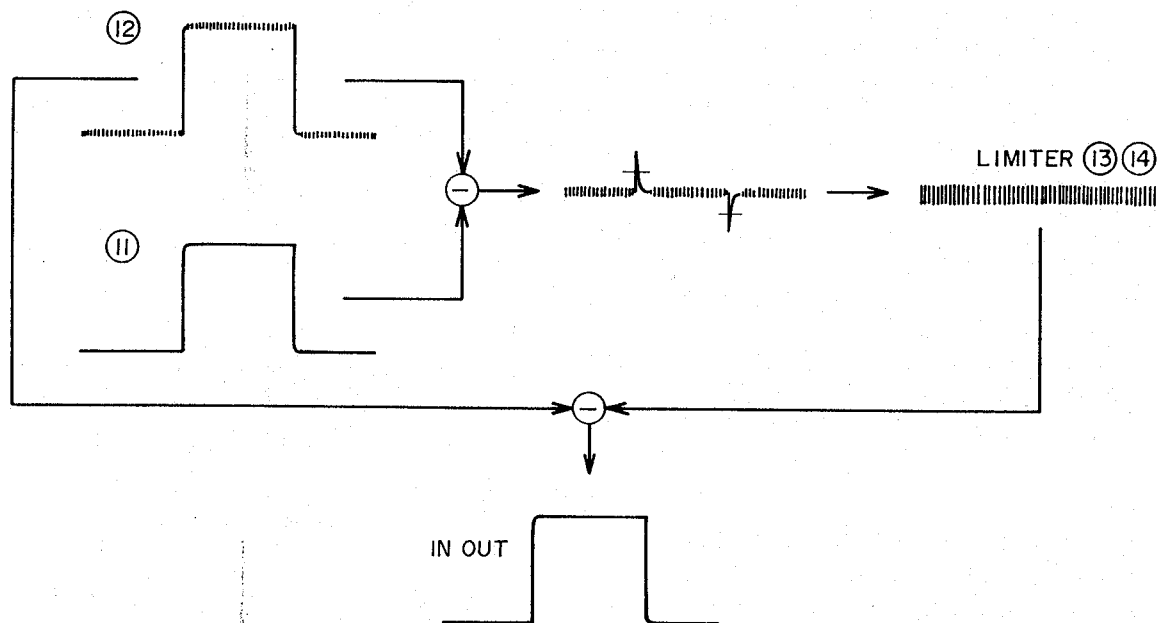


Fig. 74

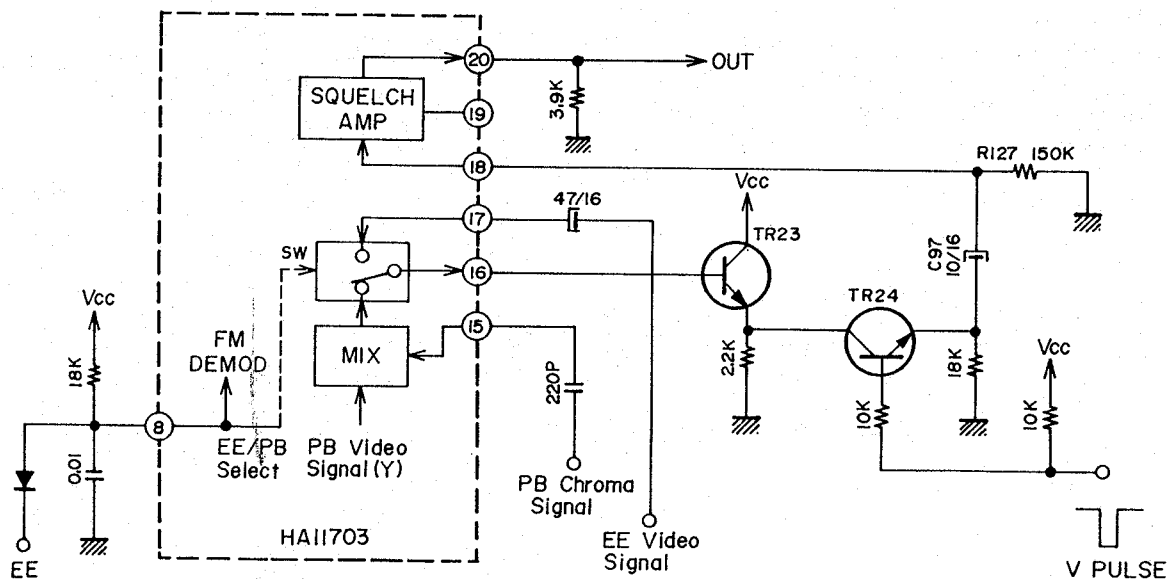


Fig. 75

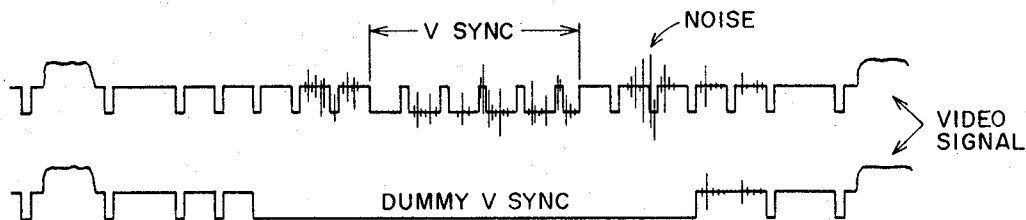


Fig. 76

voltage of Pin 8 (also the bias power source of FM demodulator). (Therefore, if the picture is not changed to PB in the play mode, it is necessary to check the voltage of EE). V. pulse (false pulse ... In the case of STILL and varying speed regeneration, noise bar appears near the V. SYNC and V. SYNC tends to be disturbed. Therefore, the false V. SYNC is inserted forcefully. This is sent from SYSCON) is inserted by TR24.

When the V pulse is high, TR24 is turned ON, and the signal is normally transmitted. When it becomes low, TR24 is turned OFF, blanking is applied. Since Pin 18 of IC HA11703, C97 and R127 set up a clamp, when TR24 is OFF, it is fixed to the SYNC level.

Pins 18 ~ 20 are video amplifiers of 6 dB, and Pin 20 is about 2 Vp-p. The balance is outputted by TR25. (LINE OUT ... VIDEO OUT-1).

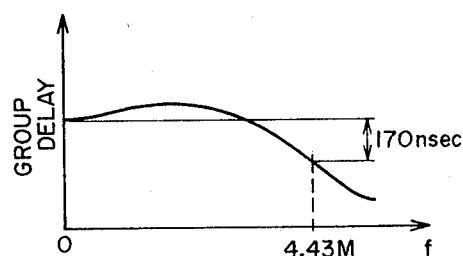


Fig. 77

#### 10) RF Converter VIDEO OUT (VIDEO OUT-2)

The video signal to be sent to the RF converter is given a prescribed delay characteristic by the equalizer LCB-56. (Fig. 77)

C101 after LCB-56 raises the low band by sub-correction.

TR26 is received by EF and the emitter resistance by the RF converter side. When TEST OSC (described later) is ON, bias is applied through the diode and TR26 is turned OFF, and the TEST signal is transmitted to the RF converter.

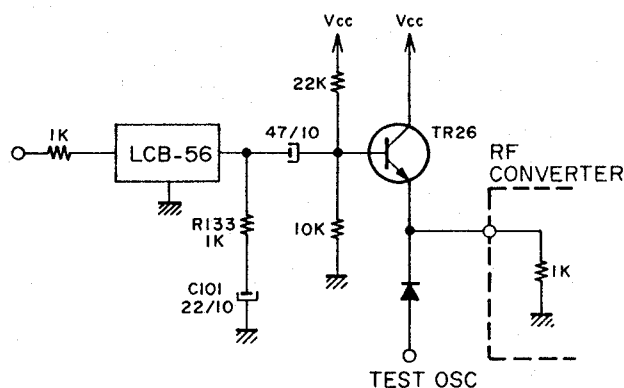


Fig. 78

#### 11) TEST OSC

TEST OSC issues the false signal to assist the TV side when it tries to search for the output of the RF converter.

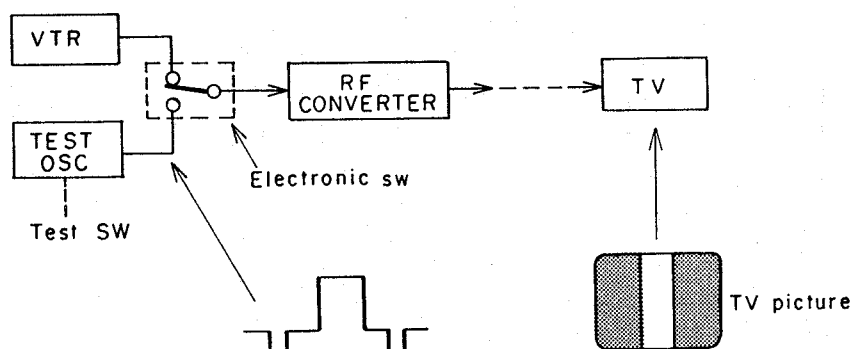


Fig. 79

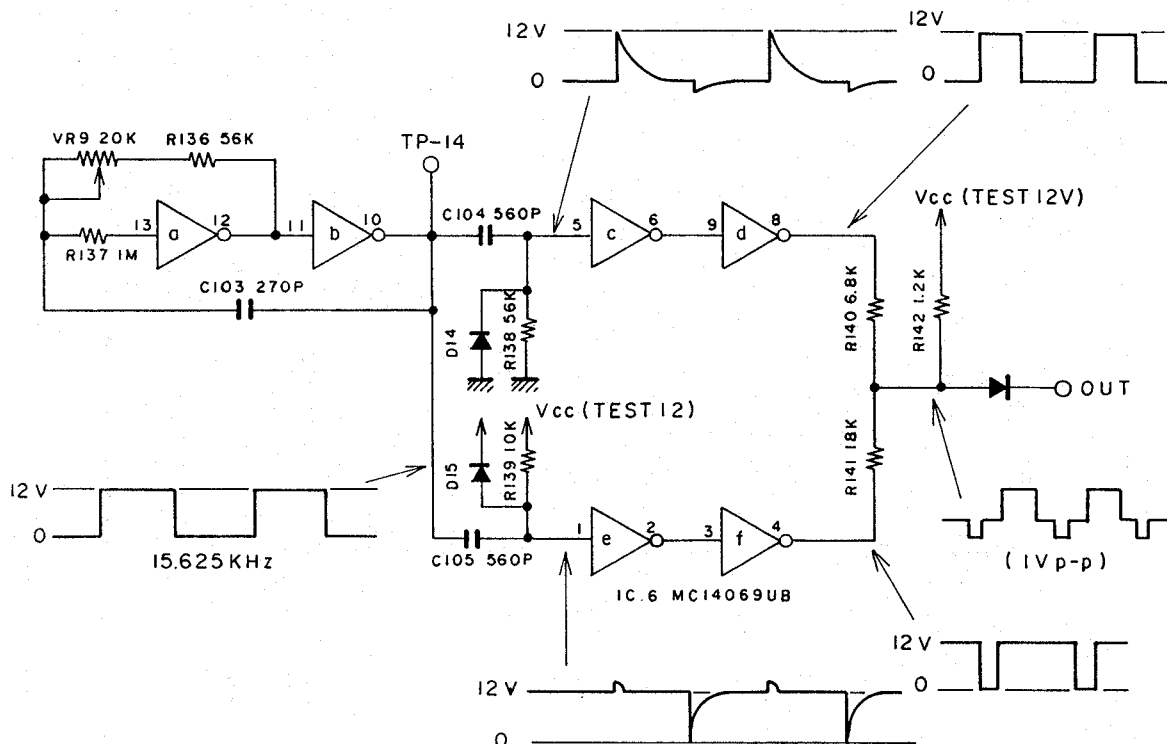


Fig. 80

The TEST OSC (Fig. 80) is operated when the TEST SW on the rear panel is turned ON and 12V is applied to the IC6 MC14069UB  $V_{CC}$ . Firstly square waves are oscillated by the inverters a and b. The oscillation frequency is determined by C103, R136 and VR9, and adjusted to 15.625 kHz by VR9. Note that oscillation may not occur if the IC is not of un-buffer type, MC14069UB. Then, the frequency is differentiated and the pulses are shaped (inverters c, d, e and f) from  $\oplus$

edge and  $\ominus$  edge, and mixed by R140 and R141 to obtain the required waveform. The amplitude is determined by R142, bias is applied by  $V_{CC}$ , TR26 is turned OFF, and the TEST signal is sent to the RF converter.

#### 4-2. Chroma Signal Circuit

Fig. 81 shows the block diagram of the chroma signal circuit.

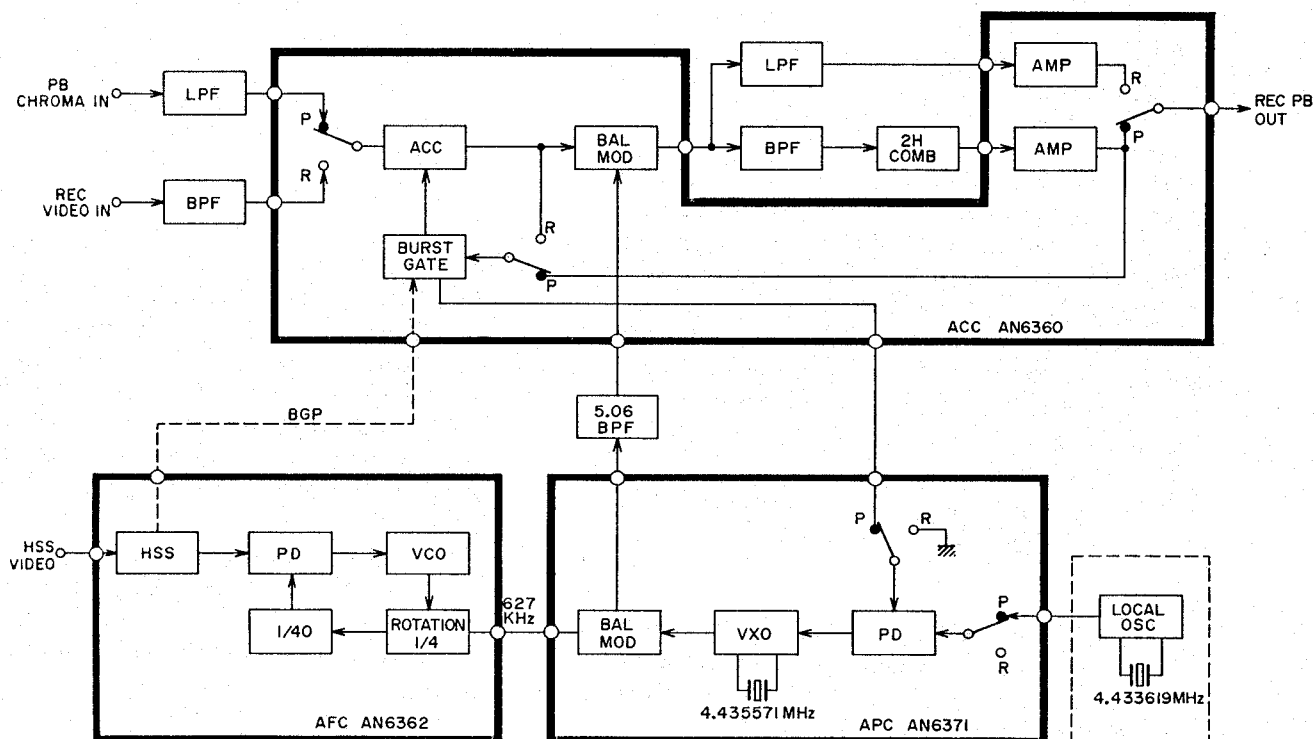


Fig. 81

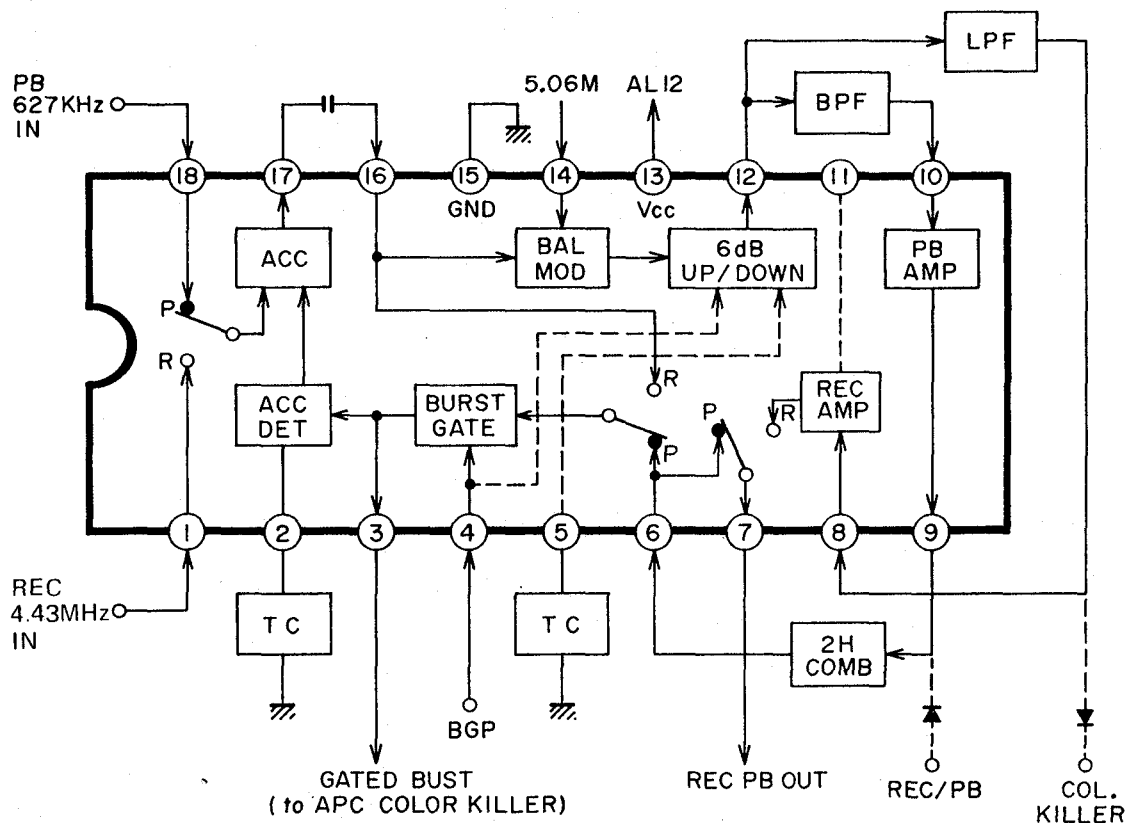


Fig. 82

#### 4-2-1. ACC

Fig. 82 shows the internal block diagram of ACC circuit.

The low chroma signal in PB and 4.43MHz signal in REC enter ⑱ and ① respectively, and after changed over by the switch, enter ACC. The switch of REC/PB is controlled by the voltage of Pin ⑨.

The time constant of ACC is determined by Pin ② and is detected by the burst level of the ACC output in REC and 2H comb filter output in PB. The ACC output ⑰ together with 5.06 MHz from ⑭ enters BAL MOD (balanced modulator), and after frequency converted, comes out to ⑫. The output ⑫ passes LPF (LCB-58) in REC and BPF (LCB-60) in PB and enters REC amplifier or PB amplifier. Then, the PB with the crosstalk removed by the comb filter enters ⑥ and is outputted to ⑦ after REC/PB switching. The output of chroma signal for both REC and PB comes out at Pin ⑦.

④ is B.G.P. input and at ③ the gated burst is outputted and sent to APC and color killer.

##### 1) REC BPF LCB-57

REC BPF is to take out only 4.43MHz chroma signal from the video input signal. The characteristic is shown in Fig. 83, and the signal is received by EF (TR28) and put into AN6360 ①.

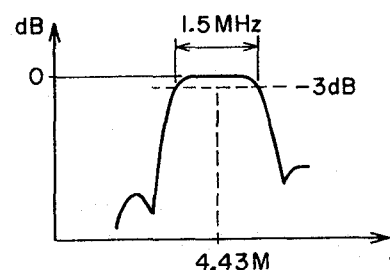


Fig. 83

##### 2) PB LPF LCB-59

PB LPF is to take out the low converted chroma signal (low chroma) 627 kHz from the pre-amplifier output during PB and also adjust the phase relation between Y and chroma during PB. The characteristic is shown in Fig. 84 and it has the delay of 0.35 msec. After LCB-59, the signal is amplified by TR27. (about 200 mVp-p color bar at 6360 ⑱).

L, C and R in TR27 collector:

L27, C109 . . . . Trap to remove H periodic noise from TV, etc.

L28, C110 . . . . 75 kHz audio bias trap (for sound dub)

R149, C108 . . . . CR for correcting frequency characteristic in REC and PB total



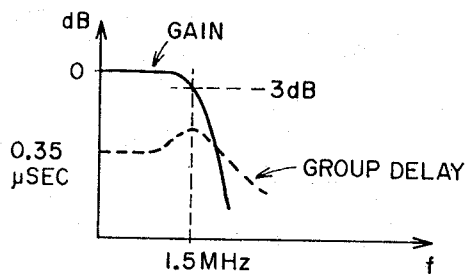


Fig. 84

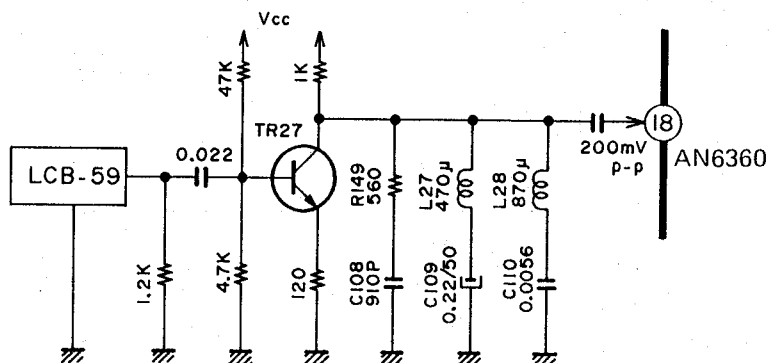


Fig. 85

3) ACC DET

The value of C is changed by TR29 so that the time constant of ACC will be fast in PB and relatively slow in REC.

#### 4) REC LPF LCB-58

REC LPF LCB-58 is to take out only low chroma signal from the frequency converted signal (Pin ⑫), and the characteristic is shown in Fig. 86.

There is a C and R network in the vicinity of REC LPF as shown in Fig. 87, and it is to correct the frequency characteristic in PB and REC total (Same for R149 and C108 in the vicinity of PB LPF LCB-59) (Fig. 88)

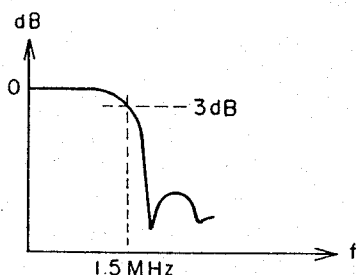


Fig. 86

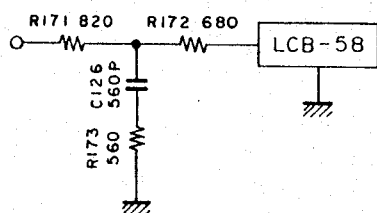


Fig. 87

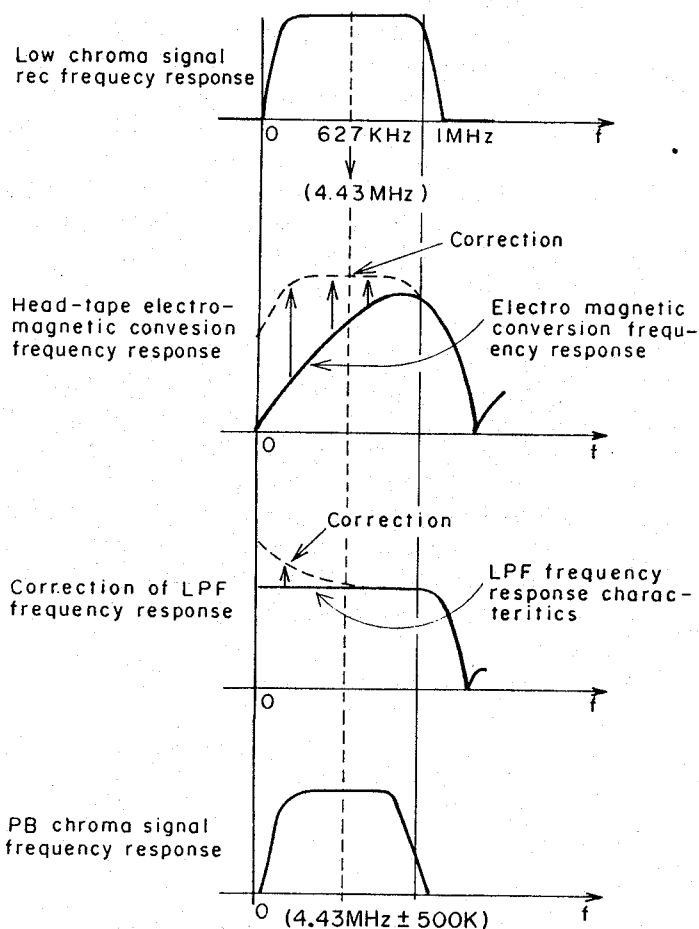


Fig. 88

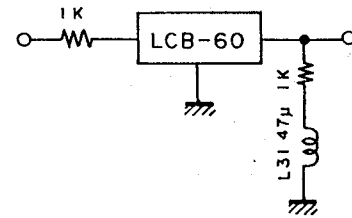
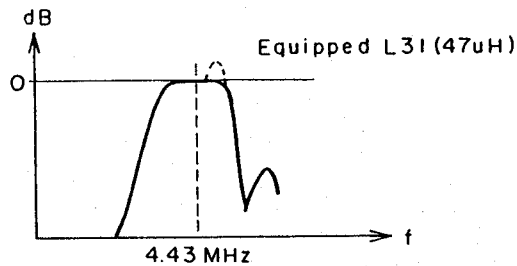


Fig. 89

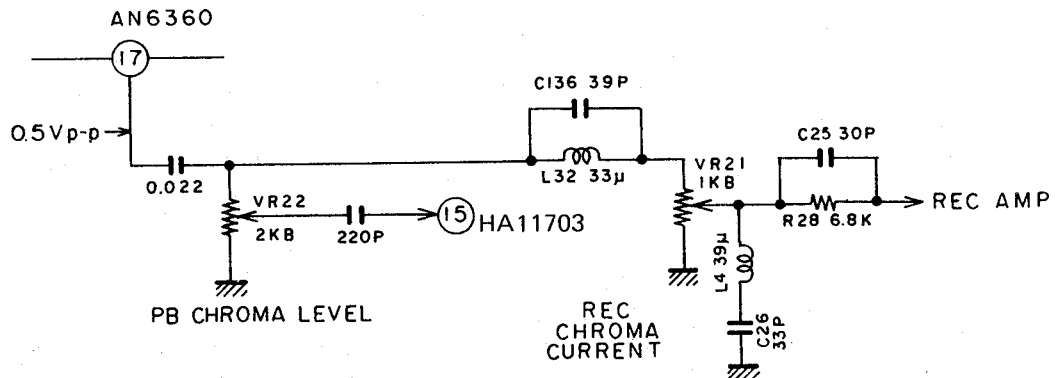


Fig. 90

#### 5) PB BPF LCB-60

LCB-60 is to take out the chroma signal of 4.43 MHz from the output ⑫ of BAL MOD during PB. (Fig. 89). Here is also provided L31 (47  $\mu$ ) behind the filter to correct the frequency characteristic same as above. (When 4.43 MHz is converted into low band, the band frequency is reversed in plus and minus. Therefore, the correction by L31 as in Fig. 89 is the correction in the same direction as the correction in Fig. 88.

#### 6) PB, REC CHROMA OUT

The chroma is outputted from AN6360 ⑦ and the PB enters HA11703 ⑮ at VR22 and is mixed with Y. REC passes the traps of C136, L32 and L4, C26 and goes to REC AMP for mixing. These traps are intended to prevent the 4.43 MHz from returning to the pre-amplifier through the REC AMP during PB. The chroma recording current is shown in Fig. 91, and it is corrected by C25 (30p) to be flat.

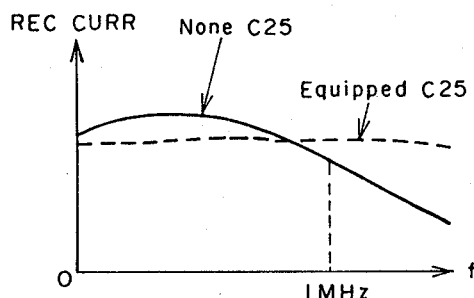


Fig. 91

#### 4-2-2. AFC Circuit

Fig. 92 shows the internal block of IC AN6362 of AFC. Video signal for HSS (from VIDEO OUT TR25) from Pin ⑧ is entered through the filter. After amplified, it enters SYNC SEPA and the output comes from ③ and it will be the source of REF V (for servo). Also, HD pulse is outputted from ⑮ by the SYNC SEPA ( $\rightarrow$  BGP). SYNC enters AFC loop, and after rotation controlled, 625 kHz is outputted at ⑫. VCO output (1/160) of AFC is outputted at ④ as SFP (SYNC FRONT PULSE). This SFP and HD are sent to SYSCON to be used for the tuner searching (To judge whether it is the video signal or not). The frequency of SFP, if measured, naturally shows 15.625 kHz if AFC is locked. The time constant of AFC is governed by C and R of Pin ⑮, and the free run frequency is adjusted by VR24 of Pin ⑭ so that Pin ⑮ DC will be 4.6V when the video signal is inputted. (TP-31).

Pin ⑮ is to run the current (15 mA) for the internal I<sup>2</sup>L logic circuit. Pin ① is the internal power source and ③ for smoothing.

Fig. 93 shows the phase relationship among SYNC, HD and SFP of the input video signal. Pin ⑪ is for controlling the rotation.

90° phase delay at 0V, 90° phase advance at 2.5V and rotary stop at 6V. In PAL, CH1 is rotary stop and CH2 is 90° delay, so swing is made to 0 ~ 6V by SW pulse. In EGN, rotation of NTSC, so it is designed so that it can be changed to the swing at 0 ~ 2.5V.

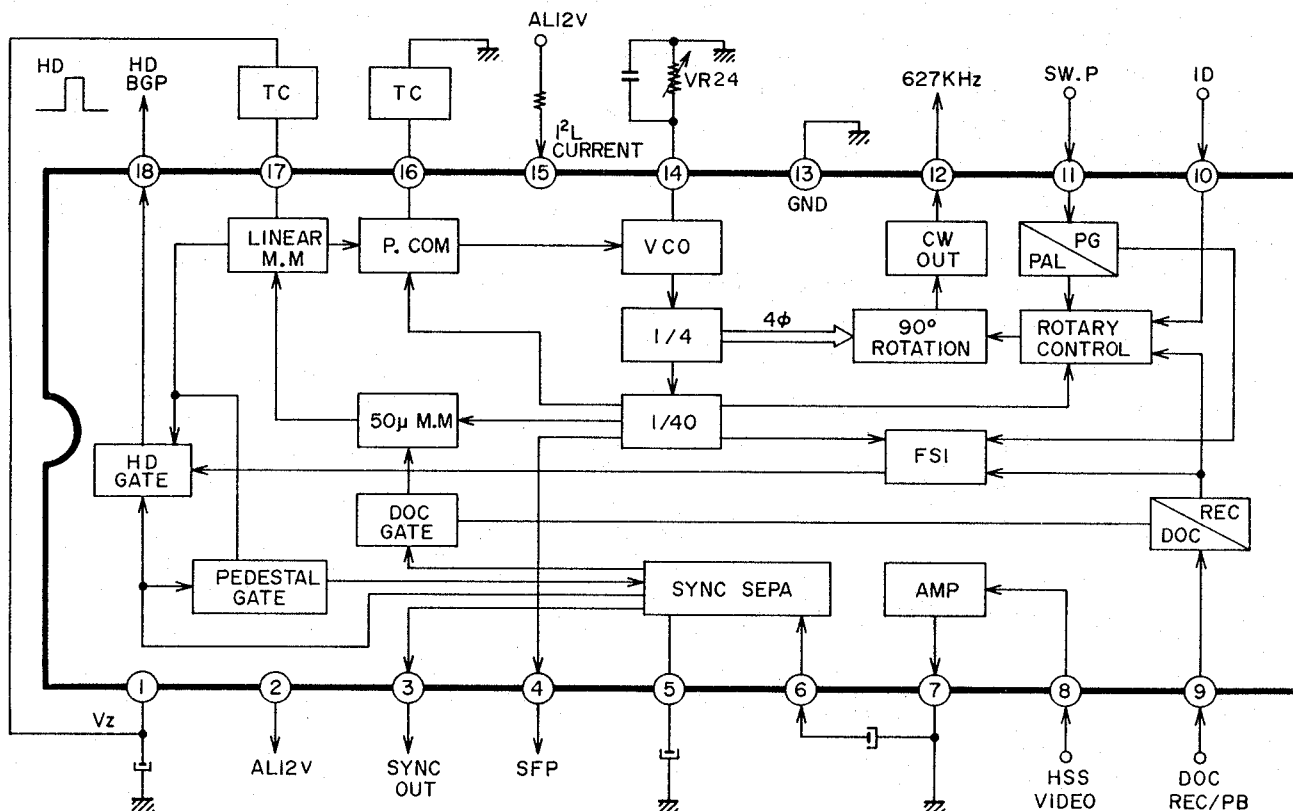


Fig. 92

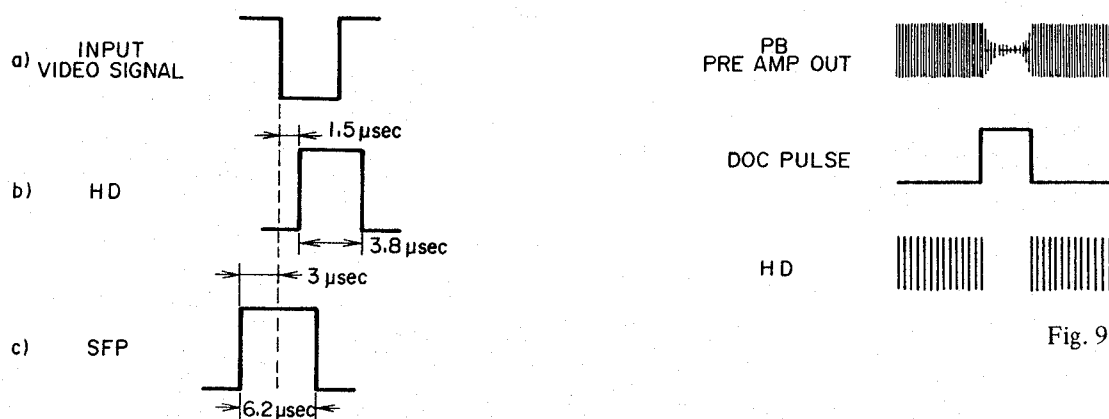


Fig. 94

Fig. 93

#### 1) DOC Circuit

Since noise is produced during the drop-out if any, it is effective to have the function to prohibit AFC and HD. This function is provided by adding the DOC pulse to Pin ⑨. When a drop-out occurs, HD is prohibited as shown in Fig. 94, BGP disappears in the meantime, and the burst is not gated. Therefore, there will be less hue disturbance when the drop-out is removed.

#### 2) FSI Function

FSI is to inhibit HD for 7 ~ 8 hours after V SYNC as shown in Fig. 95. This is to prevent the hue disorder due to the skew in the first field part.

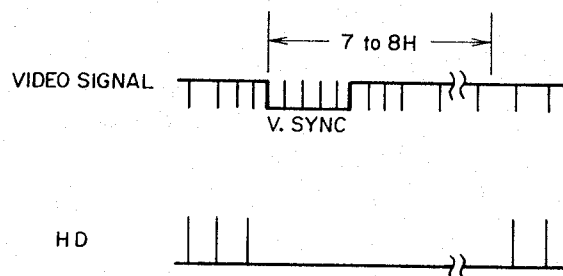


Fig. 95

That is, it inhibits APC (burst is not gated) while AFC is not stable and actuates APC when it becomes stable. This only functions during PB and during REC, change-over is made by applying the voltage to Pin ⑨.

### 3) HSS Video Filter

Pin ⑧ video for HSS is inputted after chroma, noise and other are removed by the filter as shown in Fig. 96. This affects the characteristic of AFC.

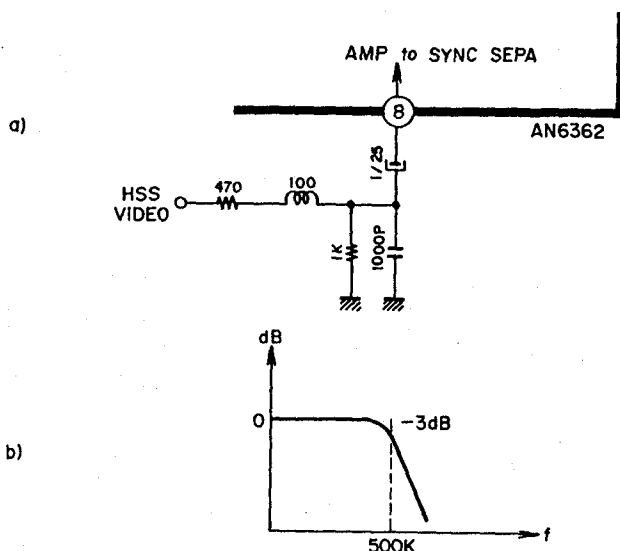


Fig. 96 HSS Video Filter

### 4) BGP

Burst gate pulse is produced from HD as shown in Fig. 97.

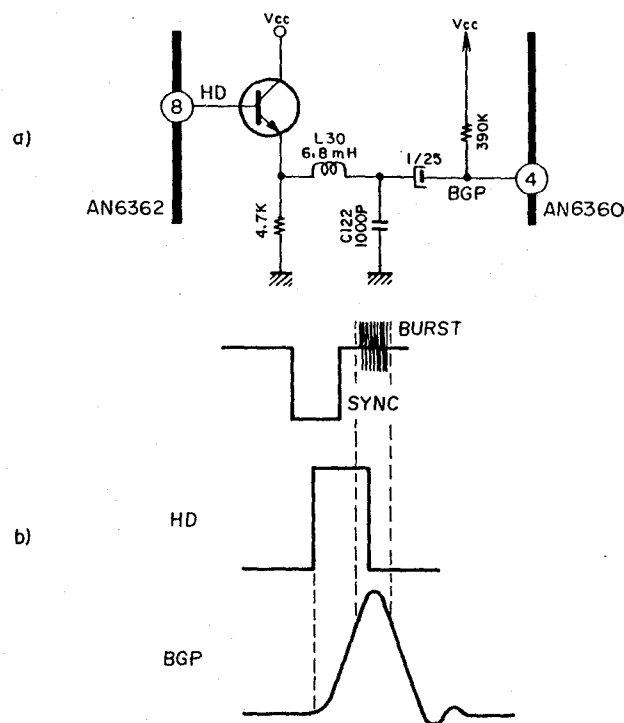


Fig. 97

### 4-2-3. APC

Fig. 98 shows the internal block of IC AN6371 of APC.

APC makes phase comparison between the burst signal from ⑬ and 90° shifted signal of ⑭ and

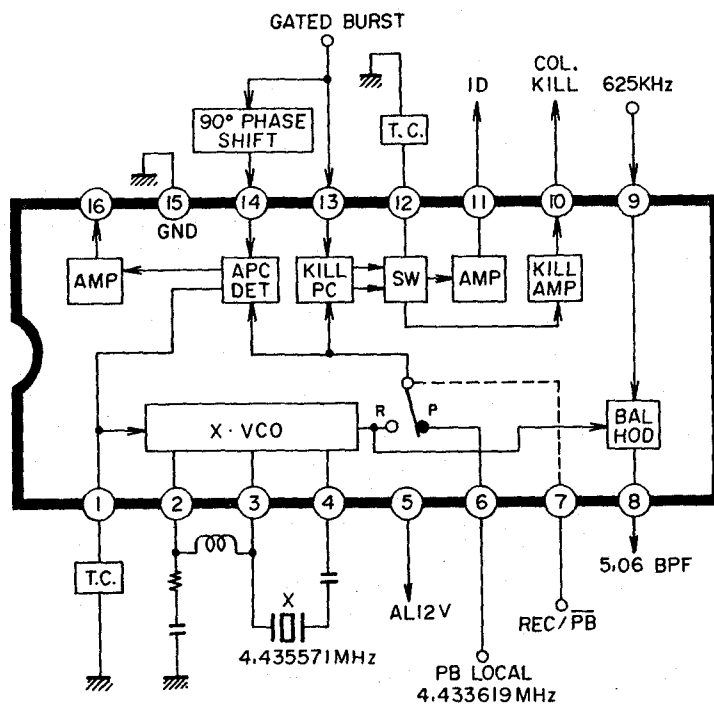


Fig. 98

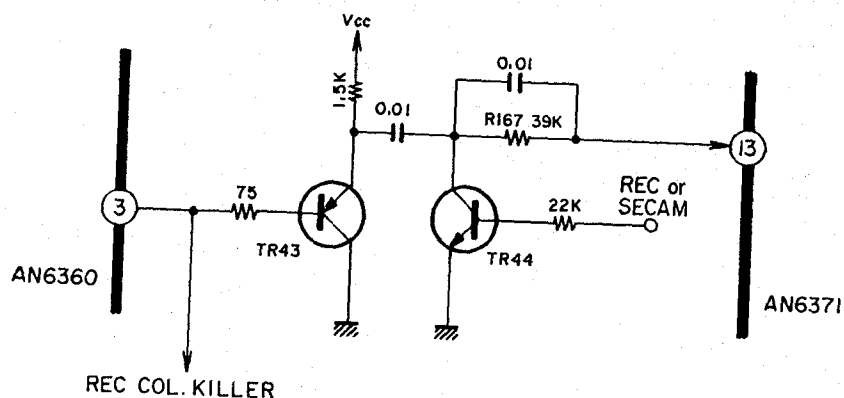


Fig. 99

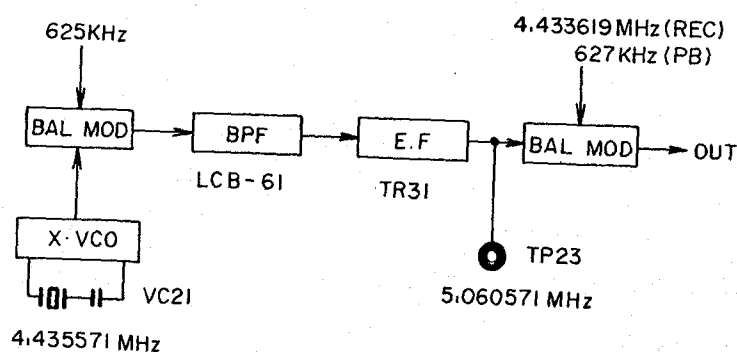


Fig. 100

VCO output (in REC) or LOCAL 4.43 MHz (in PB) Pin ⑥. REC/PB is controlled by the voltage of Pin ⑦. (it is necessary to lower the voltage under 0.7V during PB). The time constant of APC is governed by ①. Since APC is not locked (4.433619 MHz and 4.435571 MHz) during REC in PAL, the fixed oscillation is achieved by not inputting the burst. ② is the time constant of the killer and APC color killer is outputted at Pin ⑩ (DC10V fro color, 0 for B/W). If there is no burst input (no signal), this output becomes high. ⑪ is ID output. The sub-converter (BAL MOD) balance-modulates 625 kHz from AN6362 (AFC) through ⑨ and 4.43 MHz of VCO and outputs them to ⑧.

#### 1) Burst Input Circuit

The gated burst of AN6360 ③ is transmitted to APC (AN6371) but since in PAL, APC is not locked during REC, the burst is cut and 4.43M (4.435571 MHz) is oscillated fixed. During REC and SECAM (also fixed oscillation in EG, SECAM), TR44 is turned ON to cut the burst. R167 39K is to secure the R167 39K is to secure the oscillation.

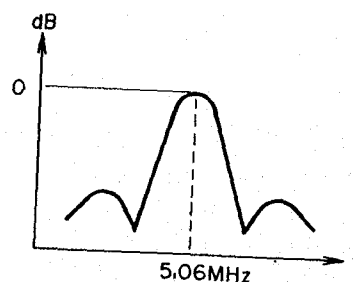


Fig. 101

#### 2) 5.06 MHz BPF

The VCO oscillation frequency in REC is adjusted by the frequency of 5.06 MHz of TP23. In such a case, if 625 kHz is phase rotated, the correct frequency can not be measured, and therefore, the rotation is stopped (SECAM MODE) and the adjustment is made by VC21 so as to achieve 5.06057 (4.435571 MHz + 625 kHz) Hz. This VC21 can be adjusted through the hole of the front display PCB and TP23 can also be fine-adjusted in line because the connector is exposing.

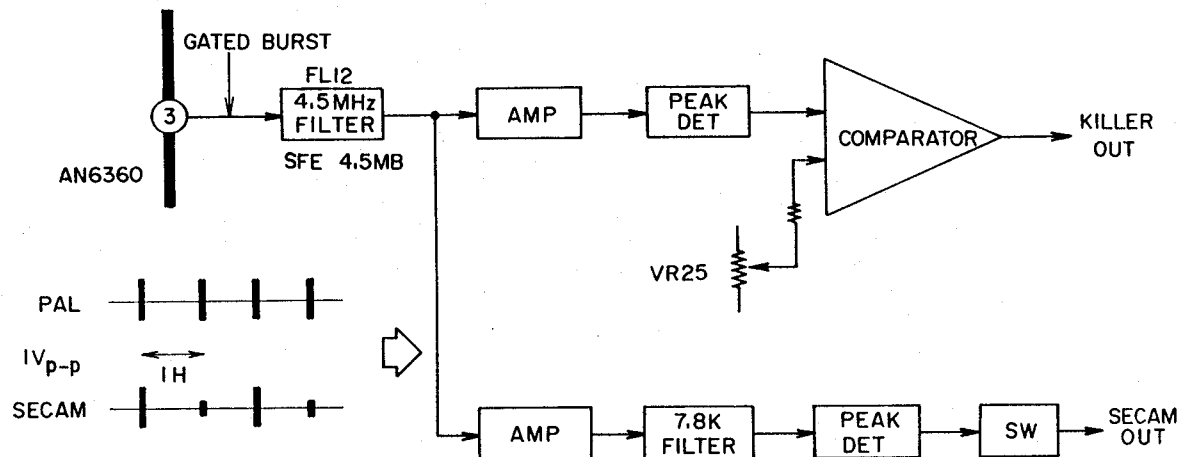


Fig. 102

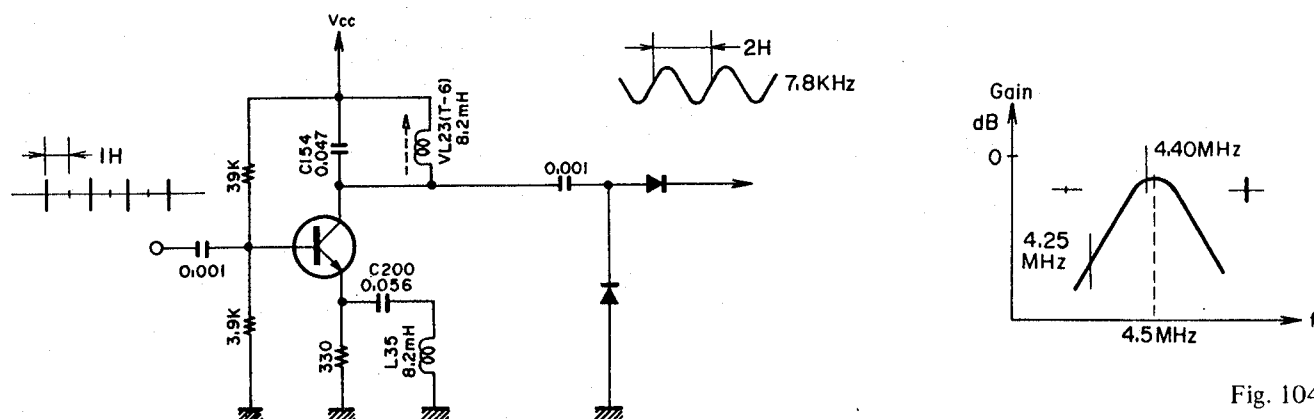


Fig. 104

Fig. 103

#### 4-2-4. REC Color Killer and SECAM Detector

In PAL the color killer cannot be used because APC is not locked during REC, and the color killer must be provided especially for REC.

VS-5 uses the color killer of level detection system. The gated burst passes the ceramic filter of 4.5 MHz and enters the color killer and SECAM detector. This filter removes noise in PAL (level difference between B/W and PAL is increases) and produces the level difference per one hour (7.8 kHz) in SECAM. This is amplified by the color killer, peak detected by two diodes and compared by IC11 (MPC741C). The reference is adjusted by VR25. The reference should be -12 dB in 75% color bar (level where the monitor becomes B/W). Since the carrier frequency of SECAM signal is changing to 4.40 MHz and 4.25 MHz every one hour, the amplitude per one hour (7.8 kHz) is taken out by utilizing the slope of the 4.5MHz ceramic filter and identified. In VS-5, the LC peaking is also put into the emitter to increase the level of 7.8 kHz. This assured that the level ratio between PAL and SECAM is more than 20 dB even

during PB. VL23 adjusts the resonance frequency of L and C so that 7.8 kHz will be maximum during SECAM. SECAM DET is not needed by EK. During SECAM (EG SECAM), the SECAM detector output (high in SECAM, low in PAL and B/W) controls the following.

- Stops rotation**  
Since the phase rotation is not carried out both for REC and PB in SECAM, Pin ⑪ of AN6362 (AFC) is made high (6 ~ 7V) by D27 to stop the rotation.
- Cuts 2H delay**  
Since there is no need of passing this because of no rotation and no possibility of removing the crosstalk, TR32 is turned OFF by D19.
- Fixes the VCO oscillation of APC**  
In principle, APC is not needed because SECAM is FM, and fixed frequency can be oscillated. Therefore, like in REC, the burst input of AN6371 is cut by TR44.

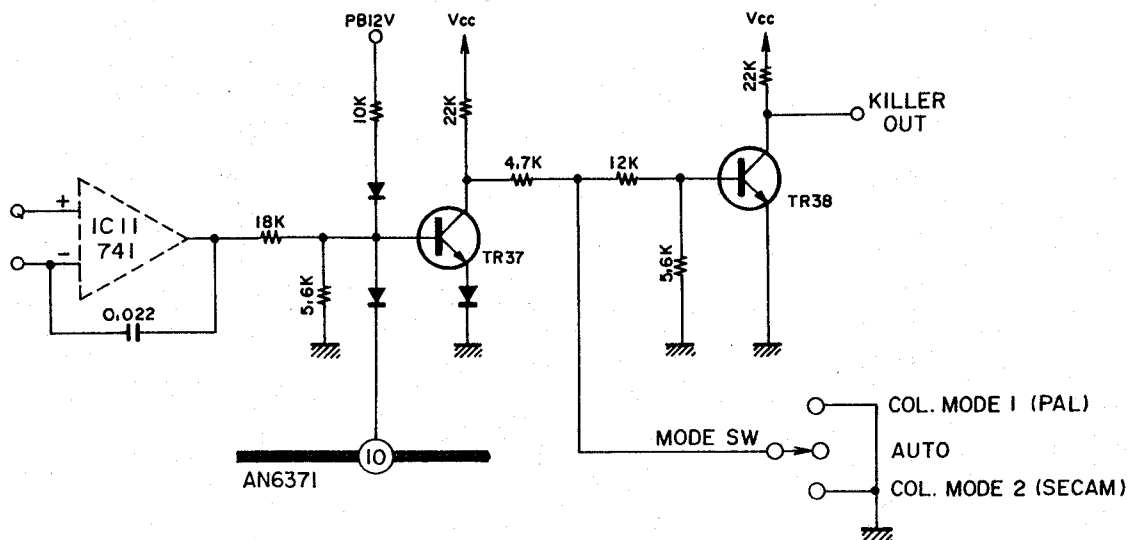


Fig. 105

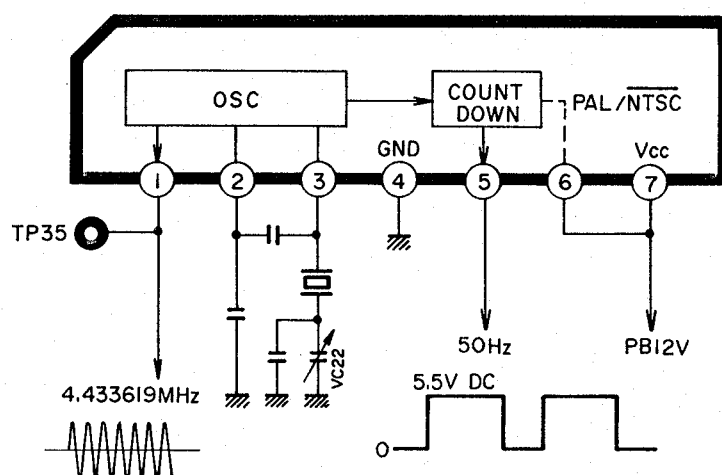


Fig. 106

### 1) REC and PB Color Killer Change-over

Change-over is necessary because REC uses the level detector and PB uses the killer of APC as aforementioned, and also needed is the control circuit by forced mode SW. This is the circuit shown in Fig. 105. (in SECAM, the APC killer is not locked and becomes Low but SECAM DET cuts the burst and as a result, the APC killer becomes High.)

### 2) Mode SW

VS-5 has a mode SW (3 positions) on its rear panel which can achieve the mode change such as

“forced PAL”, “AUTO” and “forced SECAM”. This was selected by considering the malfunction problem of the SECAM detector and the fact that the TV is watched far often in color than in B/W.

### 3) 4.433619 MHz Local OSC

Fig. 106 shows the internal block of AN6342N. This IC is to output PB4.43MHz FIX LOCAL OSC and 50 Hz for servo reference (reference V). 50 Hz is obtained by dividing 4.43 MHz (1/88672). The oscillator frequency is adjusted by VC22 to 4.433619 MHz.

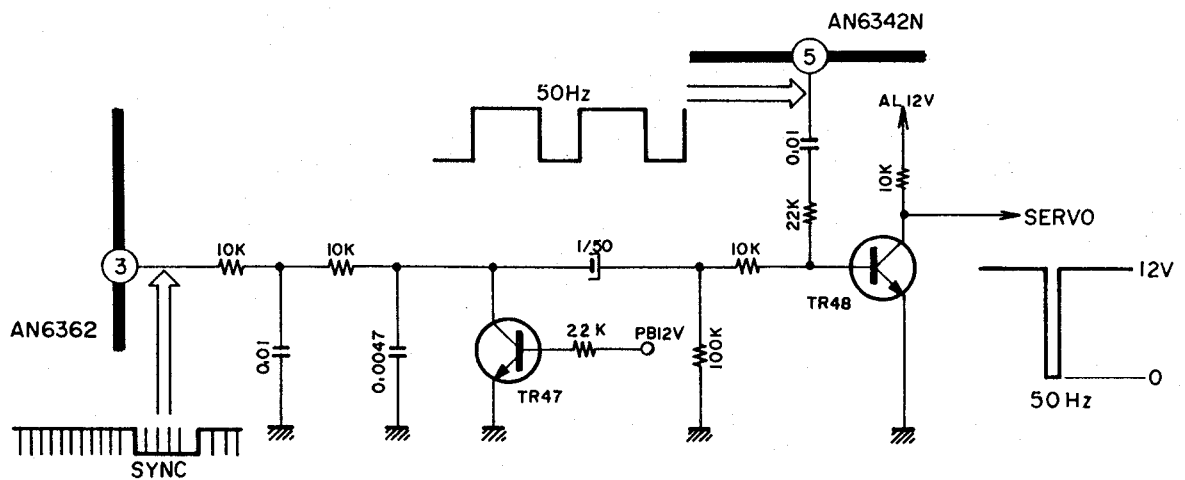


Fig. 107

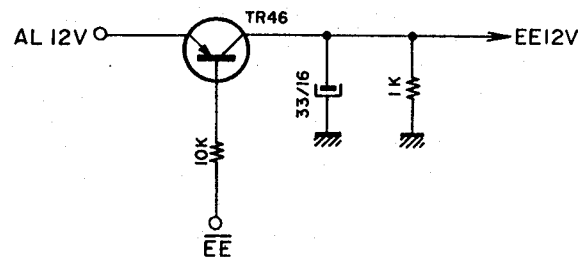


Fig. 108

#### 4) REF V Circuit

As the reference signal of Servo, it is necessary to send V of input video signal in REC and the accurate 50 Hz pulse in PB.

- The video signal V is taken out by integrating the SYNC of AN6362 ③ or produced from 50 Hz of AN6342N in PB and switched by TR47 and 48 to be sent to the servo.

#### 5) EE12V

The control line  $\overline{EE}$  comes from the SYSCON, but the video circuit uses EE12V which is obtained through the TR46 switching. (Fig. 108)



## VII. MECHANICAL ADJUSTMENT

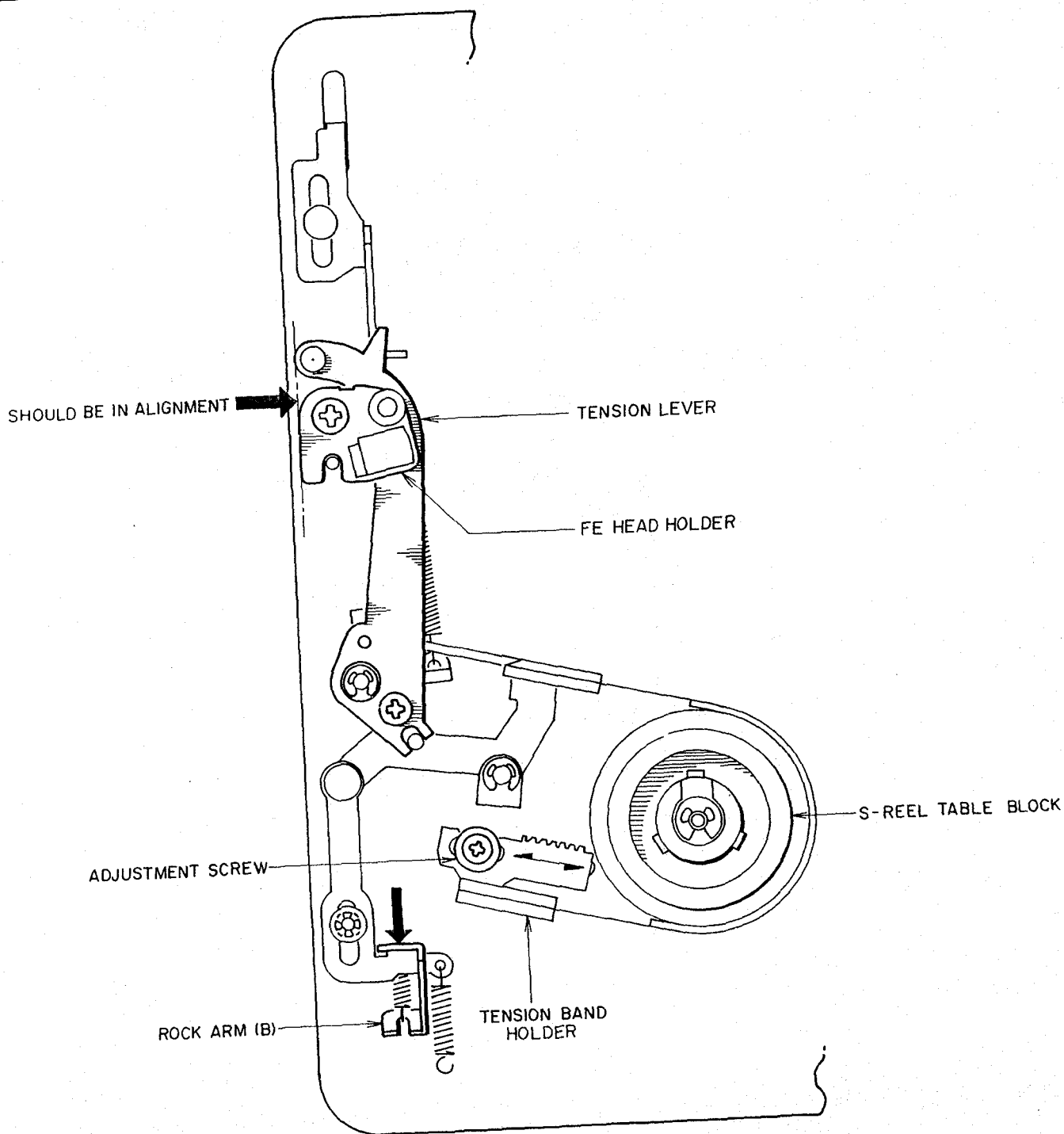


Fig. 109

### 1. TENSION LEVER POSITION ADJUSTMENT (Refer to Fig. 109)

- 1) Place the cassette holder in EJECT position.
- 2) Cover the detector lamp with a tape, etc. so that no light will leak.
- 3) Press the rock arm (B) in the arrow direction, and achieve PLAY mode.
- 4) Switch OFF the power switch on the rear panel and maintain the loading position.

- 5) Loosen the adjustment screw and adjust the tension band holder so that the tension lever and FE head holder are in alignment as shown in Fig. 109, and tighten the adjustment screw.
- 6) After adjustment, paint-lock the adjustment screw.

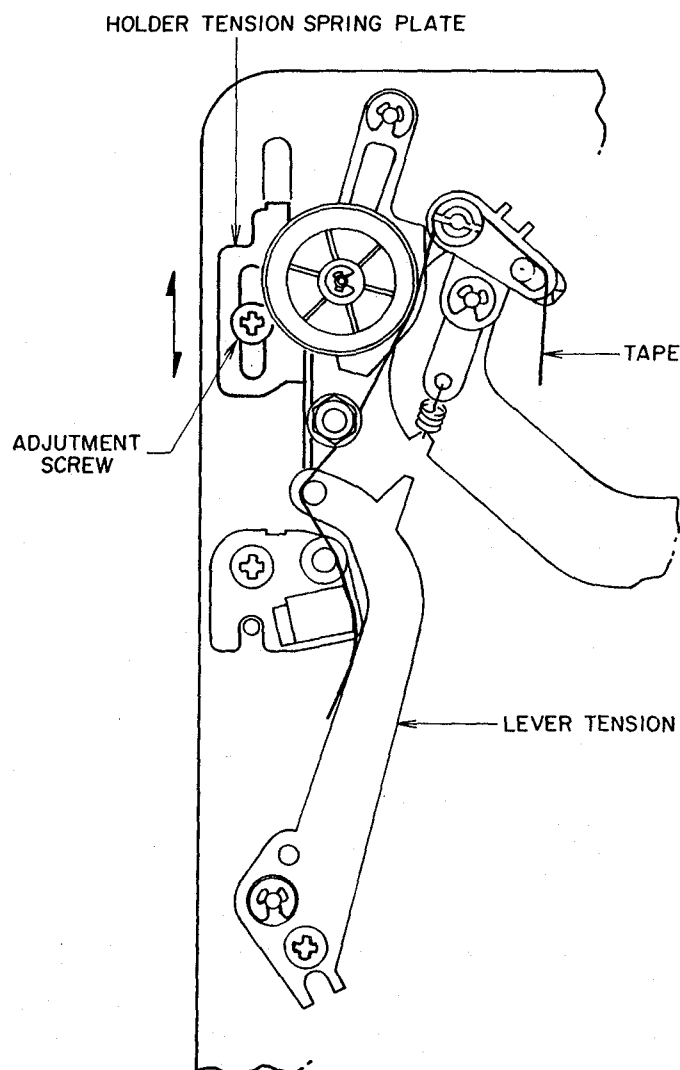


Fig. 110

## 2. BACK TENSION ADJUSTMENT

(Refer to Figs. 110, 111)

- 1) Set the back tension adj. jig (BT-001) shown in Fig. 111 and achieve PLAY mode.
- 2) Loosen the adjustment screw shown in Fig. 110, adjust the holder tension spring plate so that back tension will be 20 gf-cm, and tighten the adjustment screw.
- 3) After adjustment, paint-lock the adjustment screw.

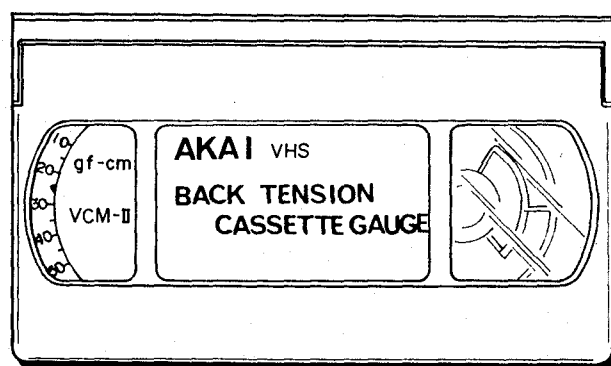


Fig. 111

### 3. CHECKING THE VARIOUS TORQUES (Refer to Figs. 112, 113)

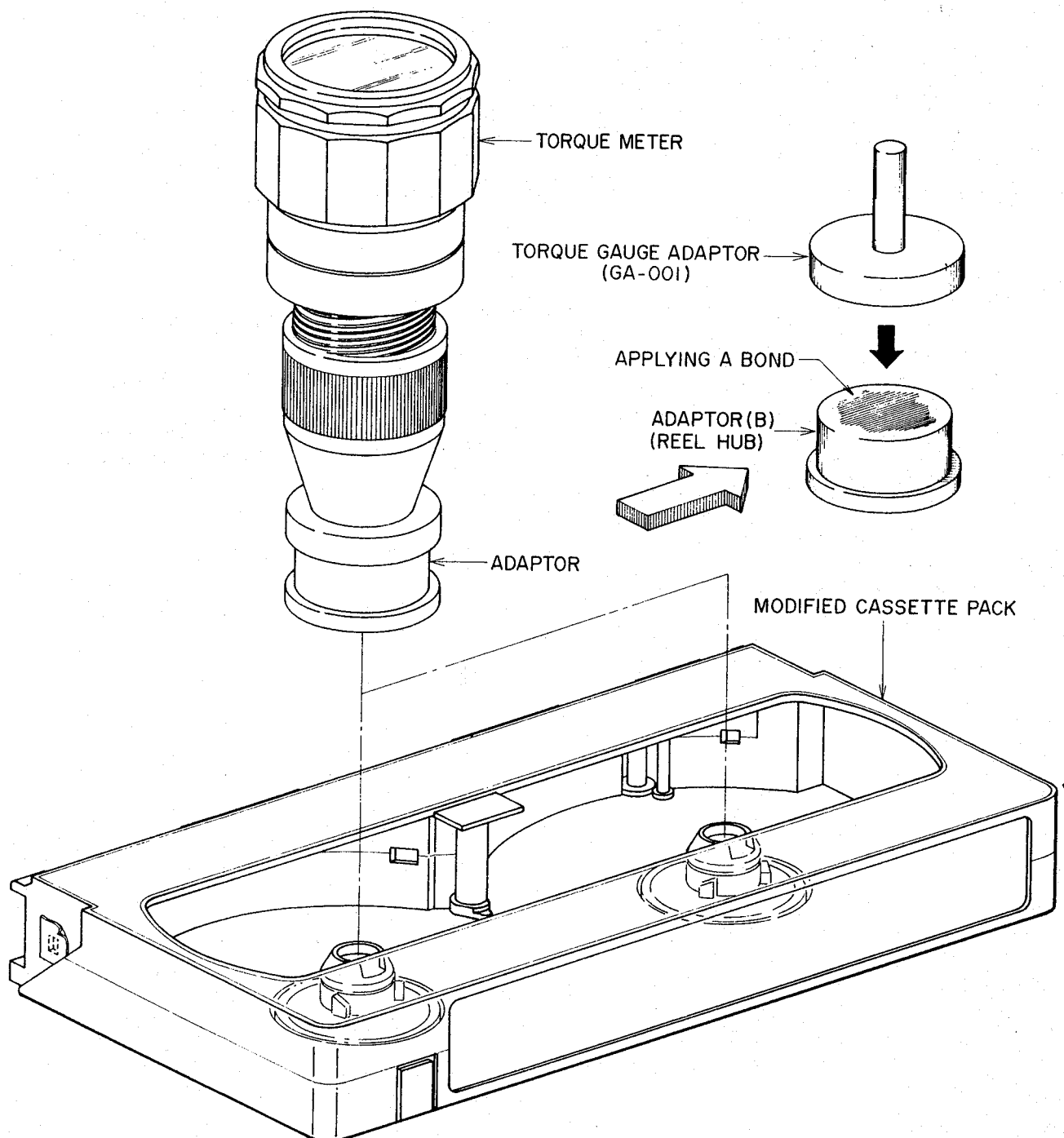


Fig. 112

| Measuring Item   | Mode      | Measuring Point | Result                  |
|------------------|-----------|-----------------|-------------------------|
| PLAY Torque      | PB        | Take-up Reel    | 120 $^{+60}_{-40}$ g.cm |
| FF Torque        | FF        | Take-up Reel    | More than 400 g.cm      |
| REW Torque       | REW       | Supply Reel     | More than 400 g.cm      |
| Cue Torque       | Cue       | Take-up Reel    | 120 $^{+60}_{-40}$ g.cm |
| Review Torque    | Review    | Supply Reel     | 200 $^{+50}_{-40}$ g.cm |
| Unloading Torque | PB → STOP | Supply Reel     | 120 $^{+60}_{-40}$ g.cm |

Fig. 113

- NOTE:**
1. The unloading torque operation is in three stages so finally, check that during unloading the tape is winding into the cassette pack correctly.
  2. A modified cassette pack is shown in Fig. 112. The upper side of the cassette pack has been cut away and the tape taken out.  
There is black tape inside the pack to prevent light from the start and end sensors. This modified pack is very useful in checking in each mode so we recommend you make your own from a defective cassette pack.  
This modified cassette pack is not available from Akai.
  3. (How to make a Torque Gauge Adapter)  
Adapter (B) is not supplied by Akai so make one by removing the reel hub of the VHS cassette tape E-120.  
Use after fixing the adapter (B) to the Torque gauge adapter (GA-001).

## VIII. REPLACEMENT OF VIDEO HEAD ASSEMBLY

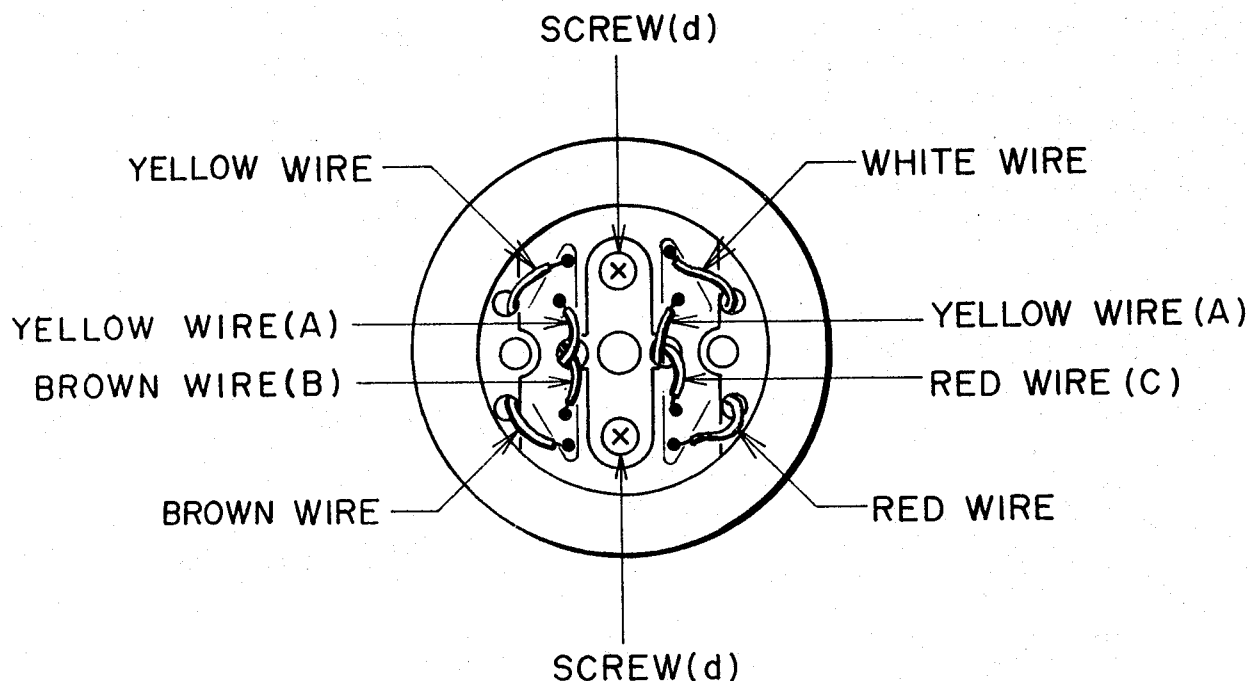


Fig. 114 Replacement of Video Head Assembly

1. Unsolder the wire (A), then unsolder the brown wire (B) and red wire (C).
2. Remove the two screws (d), then pull up the upper drum assembly.
3. Install the new head assembly and solder the wires as shown in Fig. 114.
4. Fasten two screws (d).
5. After replacement, the following adjustments are necessary.
  - 1) PB Tracking Adjustment (Servo P.C Board Step 4)
  - 2) PB Switching Point Adjustment (Servo P.C Board Step 5)
  - 3) REC Switching Point Adjustment (Servo P.C Board Step 6)
  - 4) Video Head Q (Quality factor) and resonance Adjustment (Video P.C Board Step 9)
  - 5) PB Y Level Adjustment (Video P.C Board Step 10)
  - 6) PB Chroma Level Adjustment (Video P.C Board Step 12)

# IX. TAPE TRANSPORT ADJUSTMENT

## 1. TAPE GUIDE HEIGHT ADJUSTMENT

- 1) Set the cassette tape and achieve PLAY mode.
- 2) Make adjustment with the supply guide height adjustment nut so that the lower part of the tape will pass the lower part of the guide pole without curling as shown in Fig. 115.
- 3) Make the same adjustment as that in 2) with the take-up guide height adjustment nut.

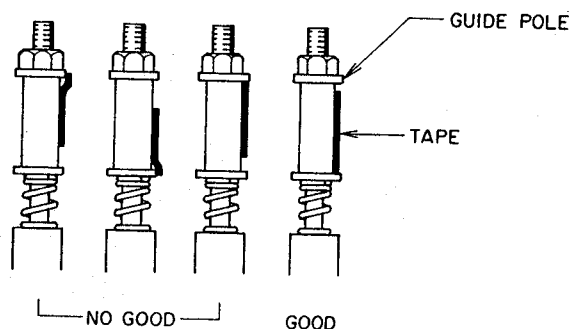


Fig. 115

## 2. GUIDE ROLLER HEIGHT ADJUSTMENT

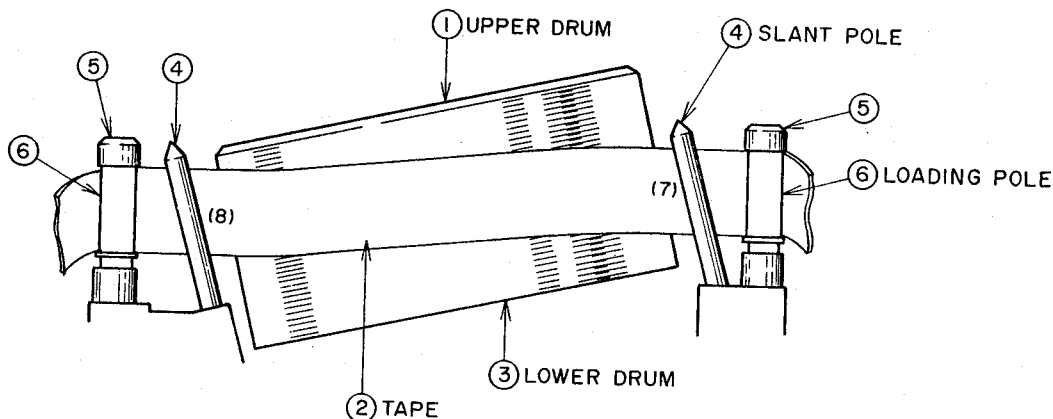


Fig. 116

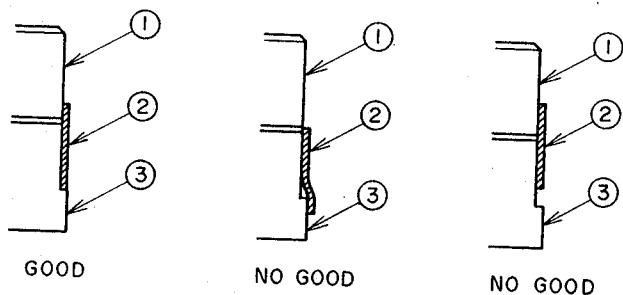


Fig. 117

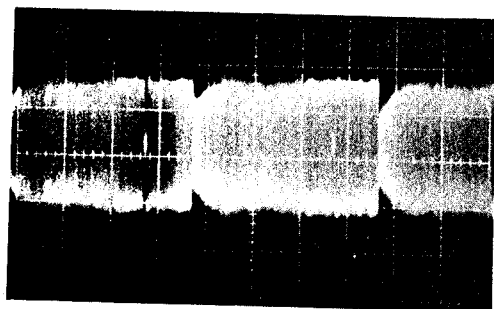


Fig. 119

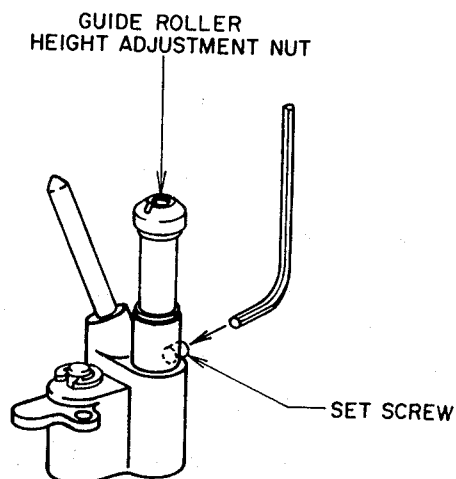


Fig. 118

- 1) Slightly loosen the set screw at the lower part of the guide roller so that the guide roller can be adjusted with reasonable tightness (See Fig. 118).
- 2) Connect an oscilloscope to TP6 (FM envelope out) of the Video P.C Board.
- 3) Set the reference tape TF-508RF and achieve PLAY mode.

- 4) Seeing to it that the oscilloscope shows such a waveform as shown in Fig. 119 and also watching the point (7) of Fig. 116, adjust the height of the guide roller (R) so that the tape runs without curling as shown in Fig. 117 (a).
- 5) Similarly, adjust the height of the guide roller (L) watching the waveform on the oscilloscope and the point (8) of Fig. 116.
- 6) Make sure that there is no shaking in the picture of the monitor TV.
- 7) Fix the guide roller with the set screw.

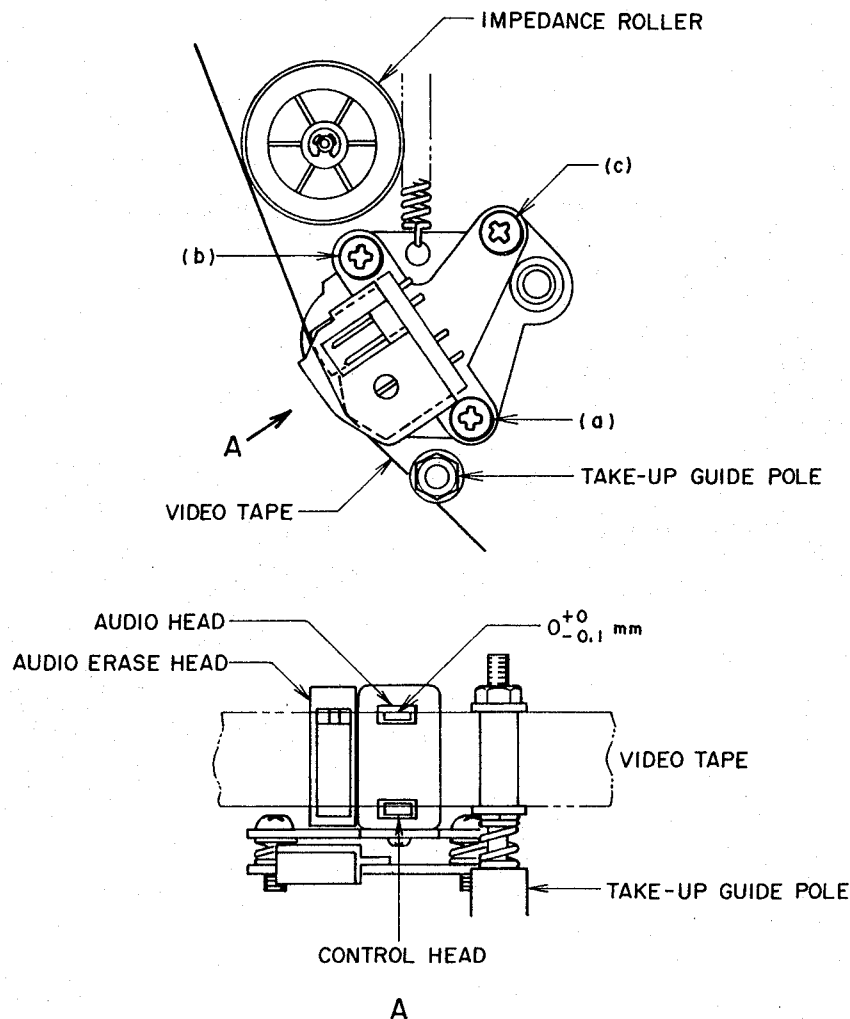


Fig. 120

### 3. AUDIO/CONTROL HEAD HEIGHT, TILT AND AZIMUTH ADJUSTMENT

- 1) Connect an AC Volt Meter to Audio Out.
- 2) Playback the reference tape TF-508RF.
- 3) Turn screws (a), (b) and (c) in order slightly but by exactly the same amount. Adjust the audio output level to its maximum. Take screw (a) as your standard and use screw (b) for azimuth adjustment. Adjust screw (c) until there is no tape wrinkle in the guide pole section, the audio output level is at maximum and there is the minimum possible level fluctuation.

Then raise and lower screw (a) very slightly and adjust (b) and (c), and set to the point for maximum output.

**NOTE:** Repeat the adjustment of tape guide height, guide roller height and audio/CTL several times in order to achieve the perfect tape running.

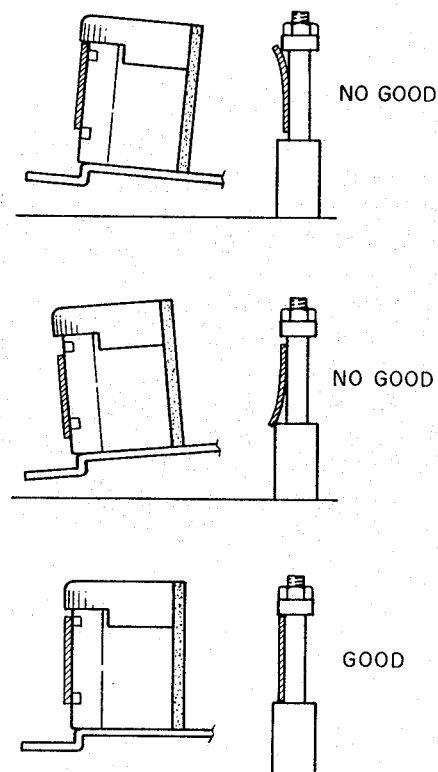


Fig. 121

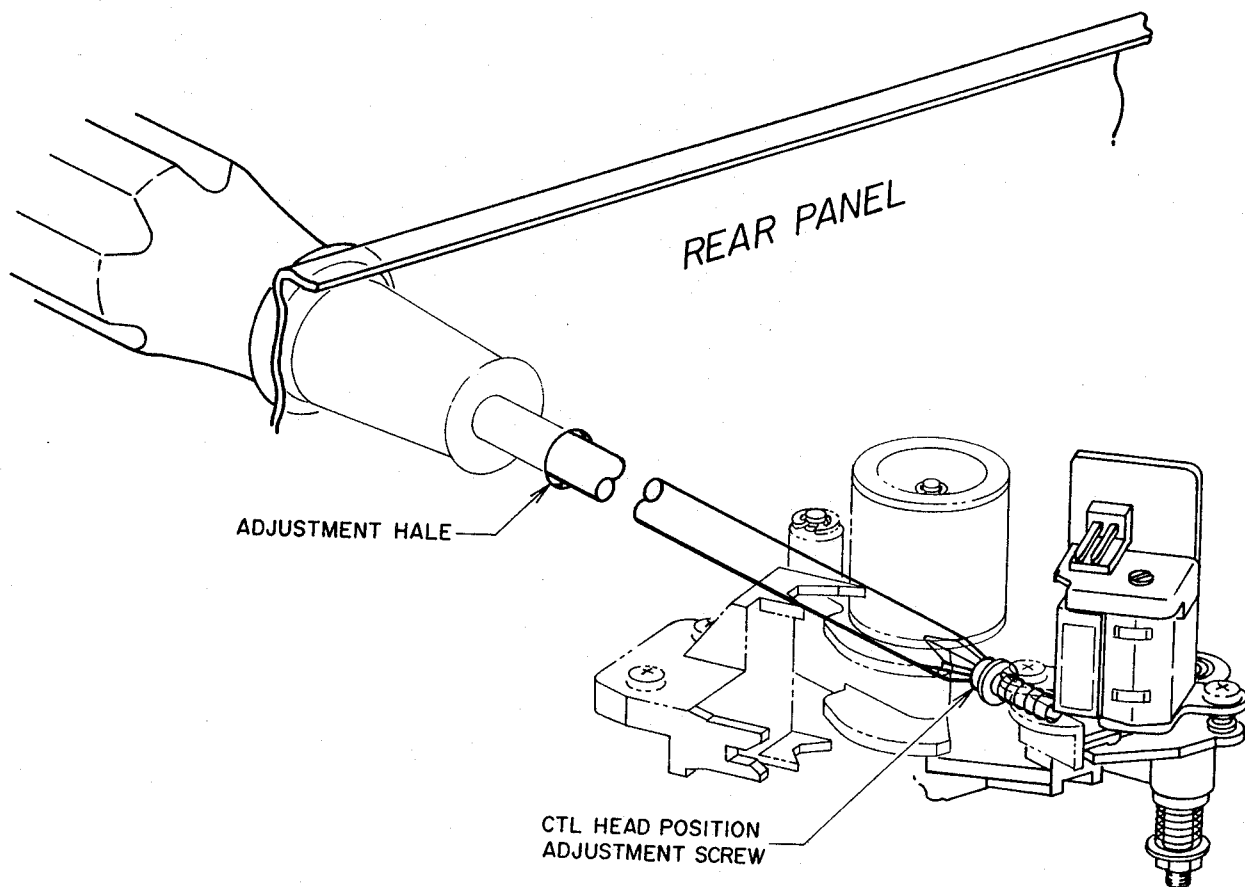


Fig. 122

#### 4. CONTROL HEAD POSITION

##### ADJUSTMENT

- 1) Connect an oscilloscope to TP6 (FM envelope out) of the Video P.C Board.
- 2) Set the reference tape TF-508RF and achieve the PLAY mode.
- 3) Insert a driver into the CTL head position adjustment screw through the adjustment hole in the center of the rear panel.
- 4) While watching the waveform of the oscilloscope, turn tracking volume on the front panel and confirm in which direction from the click position the maximum point of the waveform is located.
- 5) Turn back the tracking volume to the click position and carry out the following a) or b) adjustment.
  - a) If the maximum point of the waveform is reached by turning the tracking volume clockwise, turn the adjusting driver counterclockwise and make adjustment to the maximum point.
  - b) If the maximum point of the waveform is reached by turning the tracking volume counterclockwise, turn the adjusting driver clockwise to make adjustment to the maximum point.

**NOTE:** Make these adjustments only after the tape running is completely adjusted.



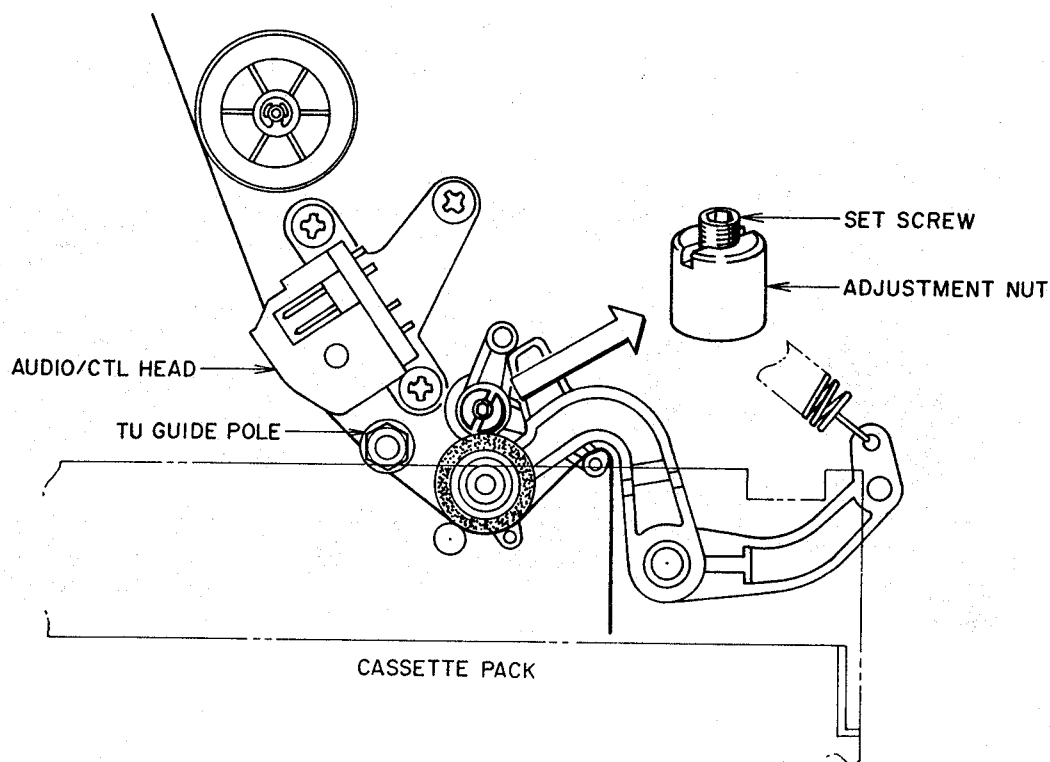


Fig. 123

## 5. ADJUSTMENT OF QUICK FINDER (REVIEW) RUN

- 1) Set the recording and playback tape E-240 and wind it up.
- 2) Press the PLAY button and REVIEW button to achieve the REVIEW mode.
- 3) Loosen the set screw in Fig. 123 so that the adjustment nut can be turned.
- 4) While watching the tape running on the take-up guide pole, turn the adjustment screw slowly so as to eliminate the curling of the tape (Fig. 124 (C)).
- 5) Tighten the set screw and fix the adjustment screw.

**NOTE:** If the adjustment nut is turned too fast, some deviation may be found after adjustment because the tape running does not follow such a fast pace.

- 6) After the completion of adjustment, press the stop button once, and after unloading the tape, recheck the review run.

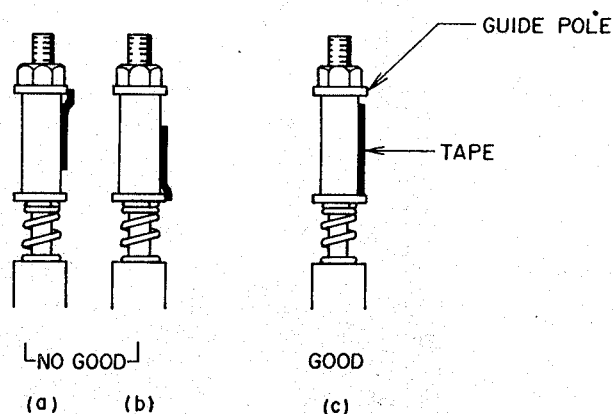


Fig. 124

## X. ELECTRICAL ADJUSTMENT

### 1. POWER SUPPLY P.C BOARD ADJUSTMENT

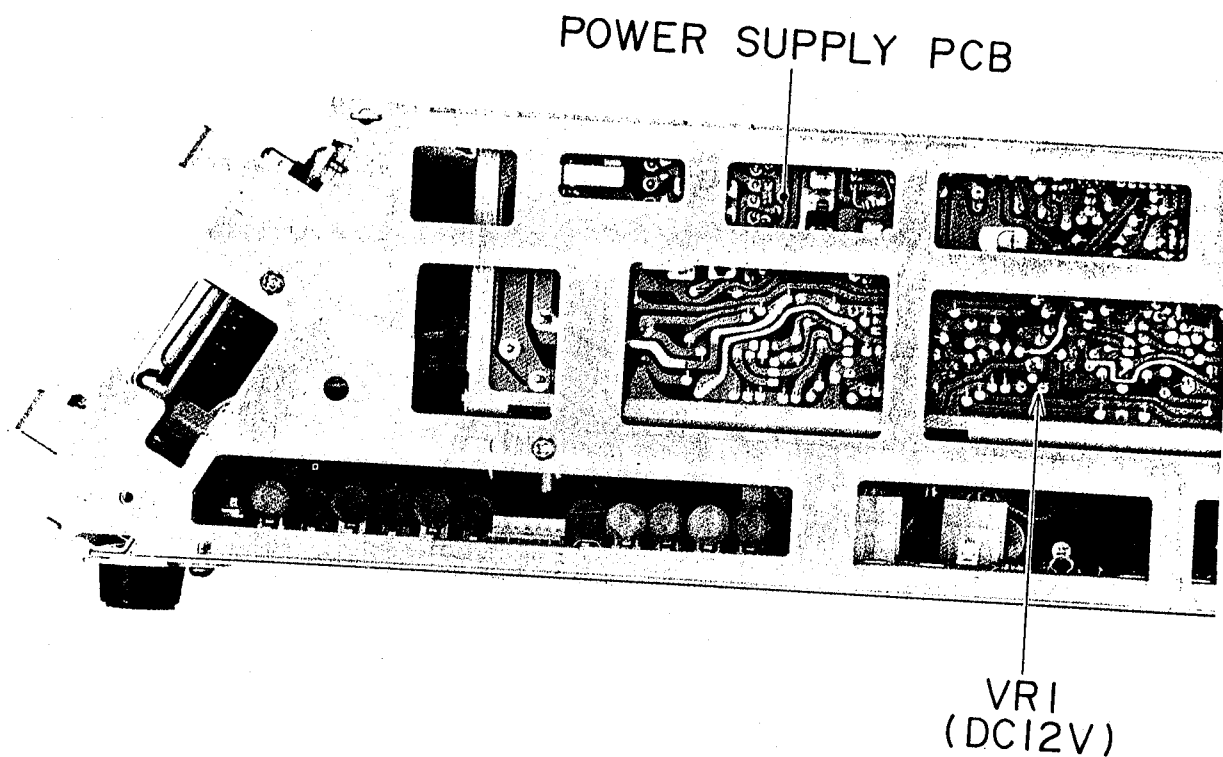


Fig. 125 DC 12V Adjustment Point (Right Side View)

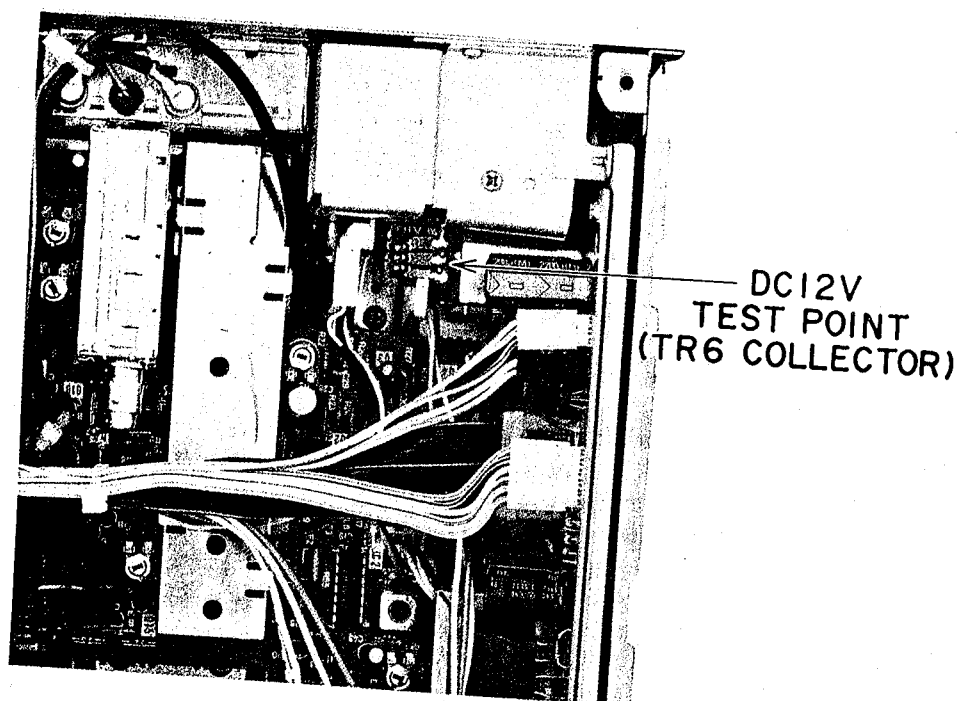


Fig. 126 DC 12V Test Point

- 1) Connect the DC voltmeter to the test point (TR6 collector).
- 2) Turn ON the function switch to achieve the STOP mode.

- 3) Adjust the VR1 on the Power Supply P.C Board so that the voltage at the test point will be  $12V \pm 0.05V$ .

## 2. SERVO P.C BOARD ADJUSTMENT

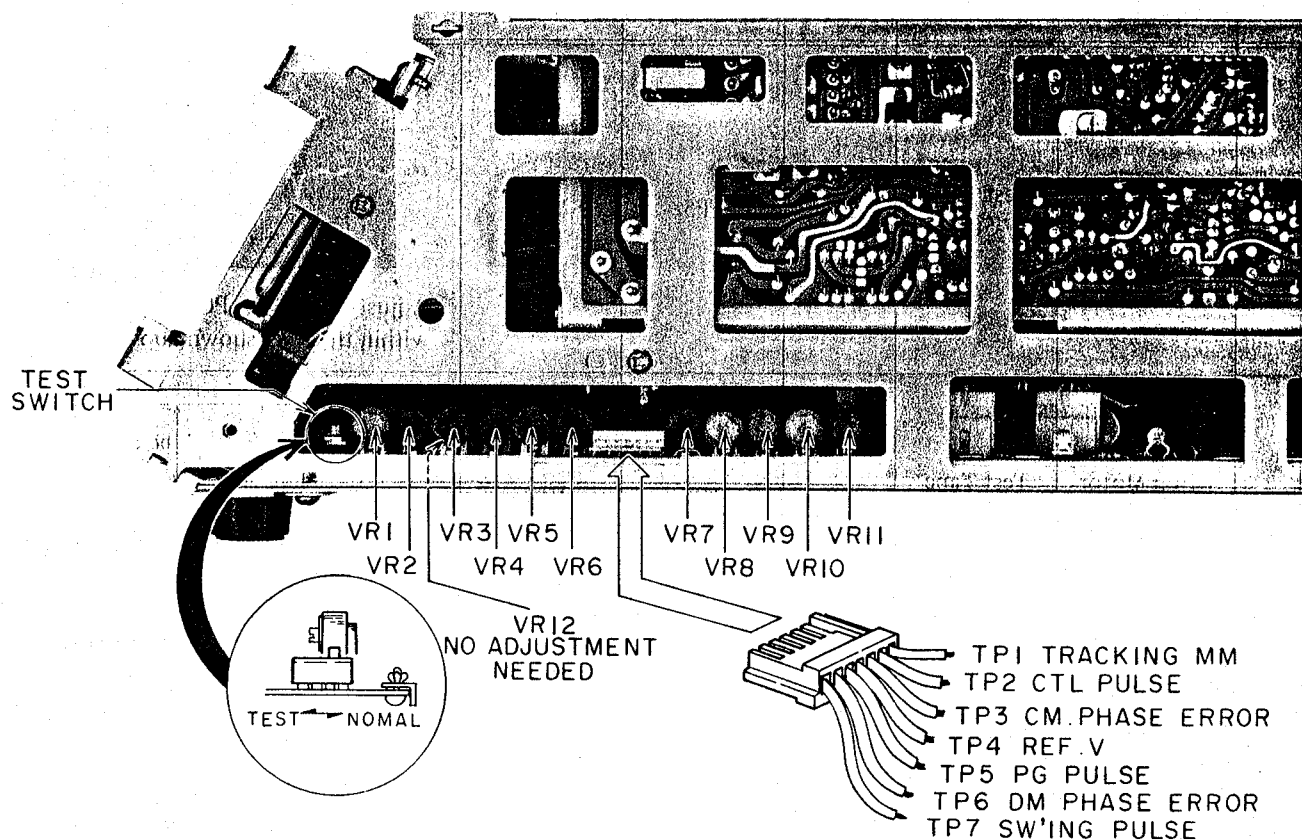
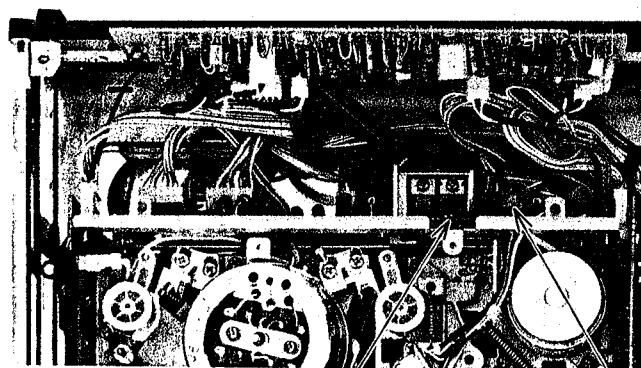


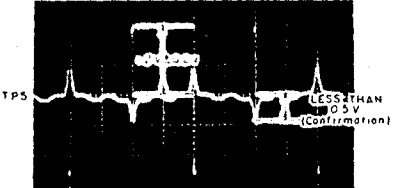
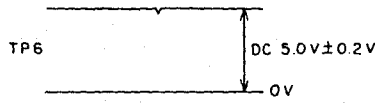
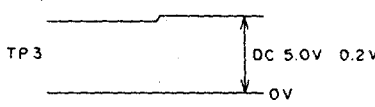
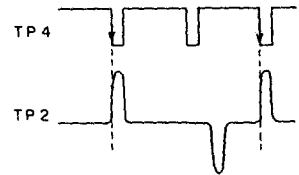
Fig. 127 Servo P.C Board V1004A5340 (Right Side View)

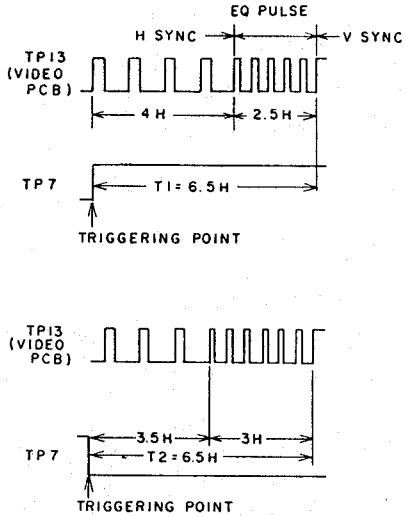
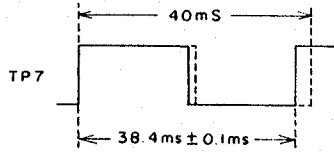
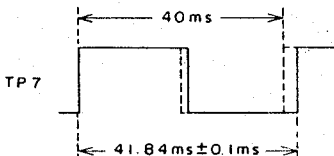


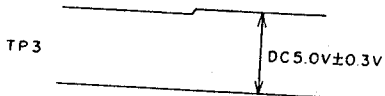
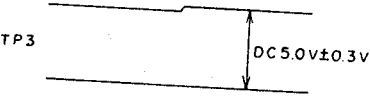
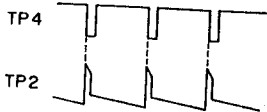
CAPSTAN  
MOTOR PCB

VR1  
TIME FOR THE STILL  
MODES NOISE BAR TO  
DISAPPEAR.

Fig. 128 Capstan Motor P.C Board V1004B5491

| Step | Adjustment Item                                               | Input                | Mode | Test Point                     | Adjustment Parts | Result & Remarks                                                                                                                                                                                                                                       |
|------|---------------------------------------------------------------|----------------------|------|--------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | PG Pulse                                                      | Test Tape (TF-508RF) | PB   | TP5                            | VR1              |  <p>Adjust so that the PG waveform is within the level shown above.</p>                                                                                             |
| 2    | Drum Motor Normal Speed                                       | Test Tape (TF-508RF) | PB   | TP6                            | VR6              |  <p>Adjust so that the drum servo phase error voltage is within <math>DC\ 5.0V \pm 0.2V</math>.</p>                                                                 |
| 3    | Capstan Motor Normal Speed                                    | Test Tape (TF-508RF) | PB   | TP3                            | VR8              |  <p>Adjust so that the capstan servo phase error voltage is within <math>DC\ 5.0V \pm 0.2V</math>.</p>                                                             |
| 4    | Tracking Preset (EXT-Tracking volume is set to OFF Position.) | Test Tape (TF-508RF) | PB   | TP4 (REF-V)<br>TP2 (CTL Pulse) | VR11             |  <p>Adjust so that the start-down waveform portion of REF-V (Servo standard signal) is brought in line with the phase of CTL pulse start-up waveform portion.</p> |

| Step | Adjustment Item         | Input                              | Mode                     | Test Point              | Adjustment Parts       | Result & Remarks                                                                                                                                                                                                           |
|------|-------------------------|------------------------------------|--------------------------|-------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5    | PB Switching Point      | Test Tape (TF-508RF)               | PB                       | TP13 (Video PCB)<br>TP7 | VR2 (CH1)<br>VR3 (CH2) |  <p>Adjust T1 with VR2 to 6.5H and T2 to 6.5H with VR3.<br/>The difference between T1 and T2 should be within 1H.</p>                    |
| 6    | REC Switching Point     | Color Bar from Color Bar Generator | REC                      | TP13 (Video PCB)<br>TP7 | VR4                    | Adjust T1 and T2 waveforms in step 5 to $6.5H \pm 1H$ .                                                                                                                                                                    |
| 7    | Drum Cue Speed          | Test Tape (TF-508RF)               | PB Cue (Quick Finder)    | TP7                     | VR5                    |  <p>Adjust so that the switching pulse width is within <math>38.4 \text{ ms} \pm 0.1 \text{ ms}</math> (4.0% increase in speed)</p>   |
| 8    | Drum Motor Review Speed | Test Tape (TF-508RF)               | PB Review (Quick Finder) | TP7                     | VR7                    |  <p>Adjust so that the switching pulse width is within <math>41.84 \text{ ms} \pm 0.1 \text{ ms}</math> (4.6% increase in speed).</p> |

| Step | Adjustment Item                                   | Input                | Mode                     | Test Point                         | Adjustment Parts        | Result & Remarks                                                                                                                                                                          |
|------|---------------------------------------------------|----------------------|--------------------------|------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9    | Capstan Motor Cue Speed                           | Test Tape (TF-508RF) | PB Cue (Quick Finder)    | TP3                                | VR10                    |  <p>Adjust so that the capstan servo phase error voltage is within <math>DC\ 5.0V \pm 0.3V</math>.</p> |
| 10   | Capstan Motor Cue Speed                           | Test Tape (TF-508RF) | PB Review (Quick Finder) | TP3                                | VR9                     |  <p>Adjust so that the capstan servo phase error voltage is within <math>DC\ 5.0V \pm 0.3V</math>.</p> |
| 11   | Time for the still mode's noise bar to disappear. | Test Tape (TF-508RF) | PAUSE/STILL              | Monitor Screen                     | VR1 (Capstan Motor PCB) | Adjust the VR1 so that the noise bar disappears smoothly.                                                                                                                                 |
| 12   | TEST SW (Tape Speed Check SW) Confirm Operation   | Test Tape (TF-508RF) | PB                       | TP4 (REF-V)<br>TP2 (FG Count Down) |                         |  <p>When TEST SW is switched to TEST, waves as shown above will appear on TP2.</p>                   |

### 3. VIDEO P.C BOARD ADJUSTMENT

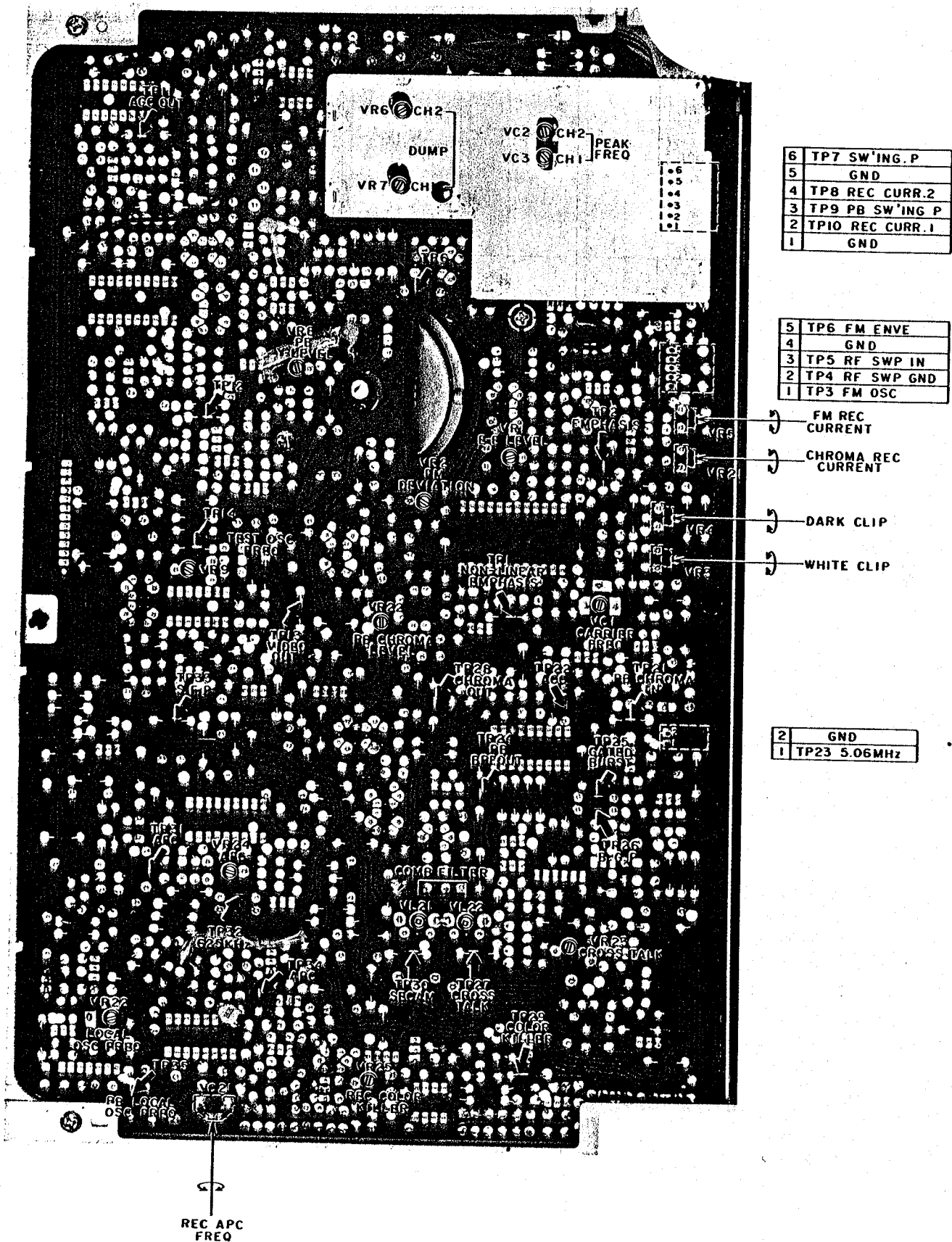
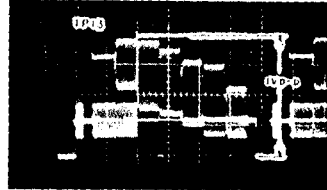
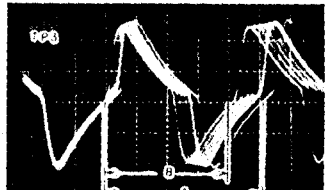
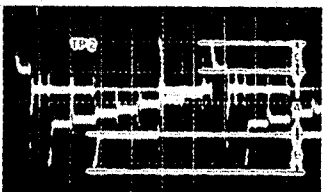
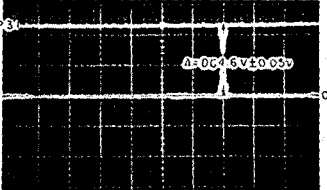
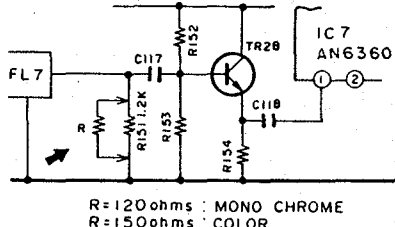
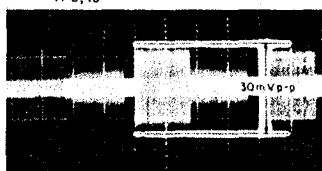
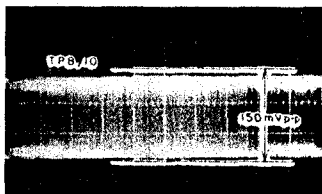
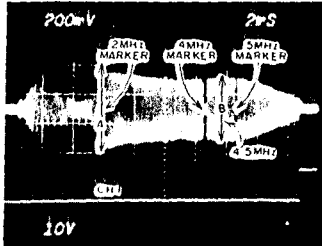
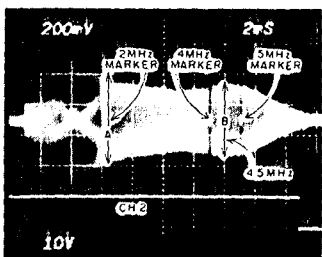
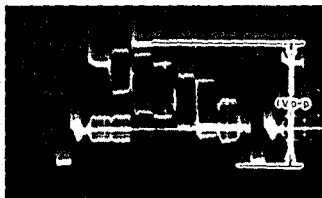
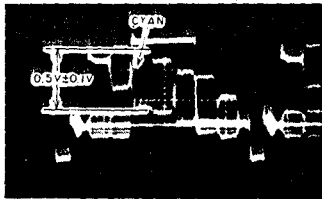


Fig. 129

| Step | Adjustment Item          | Input                              | Mode | Test Point | Adjustment Parts                     | Result & Remarks                                                                                                                                                                   |
|------|--------------------------|------------------------------------|------|------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | E-E Level                | Color Bar from Color Bar Generator | E-E  | TP13       | VR1                                  |  <p>Adjust so that the video output is 1 Vp-p.</p>                                              |
| 2    | Carrier and Deviation    | Color Bar from Color Bar Generator | REC  | TP3        | VC1 (Carrier set)<br>VR2 (Deviation) |  <p>Carrier set    A = 0.263 <math>\mu</math>s<br/>Deviation    B = 0.208 <math>\mu</math>s</p> |
| 3    | White Clip and Dark Clip | Color Bar from Color Bar Generator | REC  | TP2        | VR3 (White Clip)<br>VR4 (Dark Clip)  |  <p>White Clip    A:B = 1:0.65<br/>Dark Clip    A:C = 1:0.45</p>                               |
| 4    | Test OSC                 | No Signal                          | STOP | TP14       | VR9                                  | Set the CH SET switch to "ON" (Rear Panel) and connect the frequency counter to TP14. At this time, adjust so that the frequency is within 15.625 kHz $\pm$ 100 Hz.                |
| 5    | AFC                      | Color Bar from Color Bar Generator | E-E  | TP31       | VR24                                 |  <p>Adjust so that "A" is within DC 4.6V <math>\pm</math> 0.05V.</p>                          |
| 6    | APC                      | Color Bar from Color Bar Generator | E-E  | TP23       | VC21                                 | 5.060571 $\pm$ 10 Hz                                                                                                                                                               |



| Step | Adjustment Item  | Input                              | Mode | Test Point     | Adjustment Parts         | Result & Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------|------------------|------------------------------------|------|----------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7    | Rec Color Killer | Color Bar from Color Bar Generator | E-E  | Monitor screen | VR25                     |  <p>R=120ohms : MONO CHROME<br/>R=150ohms : COLOR</p> <p>Set the mode switch of rear panel to "AUTO". Connect 120 ohms resistance and subsequently 150 ohms resistance to the R151 (1.2 ohms) of Video PCB. At this time, adjust so that a monochrome picture appears at 120 ohms and a color picture appears at 150 ohms.</p>                                                                                                                      |
| 8    | Rec Current      | Color Bar from Color Bar Generator | REC  | TP8<br>TP10    | VR21 (CHROMA)<br>VR5 (Y) |  <p>(a) CHROMA REC CURRENT</p>  <p>(b) Y REC CURRENT</p> <ol style="list-style-type: none"> <li>1) Fully turn the VR5 clockwise.</li> <li>2) Adjust the Chroma Rec current so that TP8 and TP10 waveforms are set to 30 mVp-p by the VR21.</li> <li>3) Adjust the Y Rec current so that the TP8 and TP10 waveforms are set to 150 mVp-p by the VR5.</li> </ol> |

| Step | Adjustment Item                             | Input                | Mode | Test Point | Adjustment Parts                     | Result & Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------|---------------------------------------------|----------------------|------|------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9    | Video Head Resonance and Q (quality factor) | Test Tape (TF-515SW) | PB   | TP6        | VC2<br>VR7 (CH1)<br>VC3<br>VR6 (CH2) |   <ol style="list-style-type: none"> <li>1) Apply DC +12V to the TP7.</li> <li>2) Fully turn the VR7 clockwise and then adjust the VC2 so that the peak frequency is 4.8 MHz.</li> <li>3) Adjust the VR7 so that "Q" is set at a ratio of A : B = 1 : 0.8.</li> <li>4) Connect the TP7 to the GND level and adjust the CH2 (VC3, VR6) in the same way as in the CH1.</li> </ol> |
| 10   | PB Y Level                                  | Test Tape (TF-510CB) | PB   | TP13       | VR8                                  |  <p>Adjust so that the video output is 1 Vp-p.</p>                                                                                                                                                                                                                                                                                                                                                                                                               |
| 11   | Local OSC                                   | Test Tape (TF-510CB) | PB   | TP35       | VC22                                 | 4.433619 MHz $\pm$ 15 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 12   | PB Chroma Level                             | Test Tape (TF-510CB) | PB   | TP13       | VR22                                 |  <p>As shown in the figure above, adjust so that a cyan level is within 0.5V <math>\pm</math> 0.1 Vp-p.</p>                                                                                                                                                                                                                                                                                                                                                      |

#### 4. AUDIO P.C BOARD ADJUSTMENT

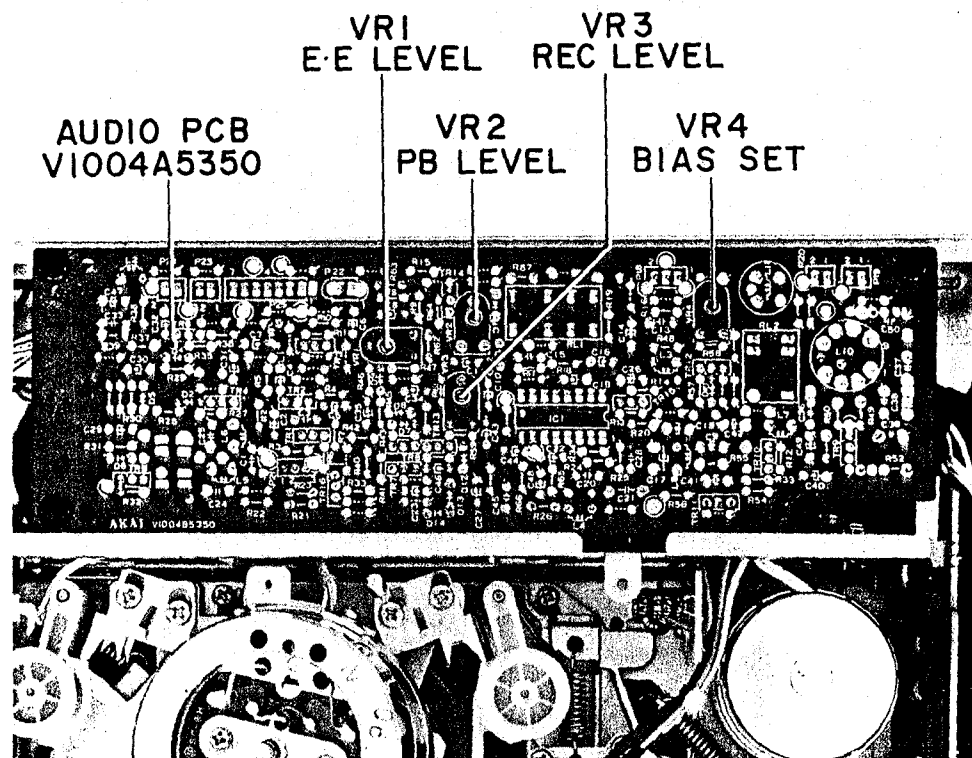


Fig. 130

| Step | Adjustment Item                       | Input                                                           | Mode   | Test Point | Adjustment Parts | Result & Remarks                                                                          |
|------|---------------------------------------|-----------------------------------------------------------------|--------|------------|------------------|-------------------------------------------------------------------------------------------|
| 1    | E-E Level                             | Audio Input<br>1 kHz, -20 dB                                    | E-E    | Audio Out  | VR1              | -6 dBm $\pm$ 0.5 dBm                                                                      |
| 2    | PB Level                              | Test Tape<br>TF-513LS<br>(1,000 Hz)                             | PB     | Audio Out  | VR2              | -6 dBm $\pm$ 0.5 dBm                                                                      |
| 3    | Rec Level                             | Audio Input<br>1 kHz, -20 dB                                    | REC/PB | Audio Out  | VR3              | -6 dBm $\pm$ 0.5 dBm                                                                      |
| 4    | Frequency Response                    | Audio Input<br>100 Hz, -20 dB<br>1 kHz, -20 dB<br>7 kHz, -20 dB | REC/PB | Audio Out  | VR4              | 100 Hz : -6 dBm $\pm$ 1 dBm<br>1 kHz : -6 dBm $\pm$ 0.5 dBm<br>7 kHz : -6 dBm $\pm$ 2 dBm |
| 5    | Distortion Factor                     | Audio Input<br>1 kHz, -20 dB                                    | REC/PB | Audio Out  | Confirm          | Less than 3%                                                                              |
| 6    | Adjust by repeating steps 3, 4 and 5. |                                                                 |        |            |                  |                                                                                           |

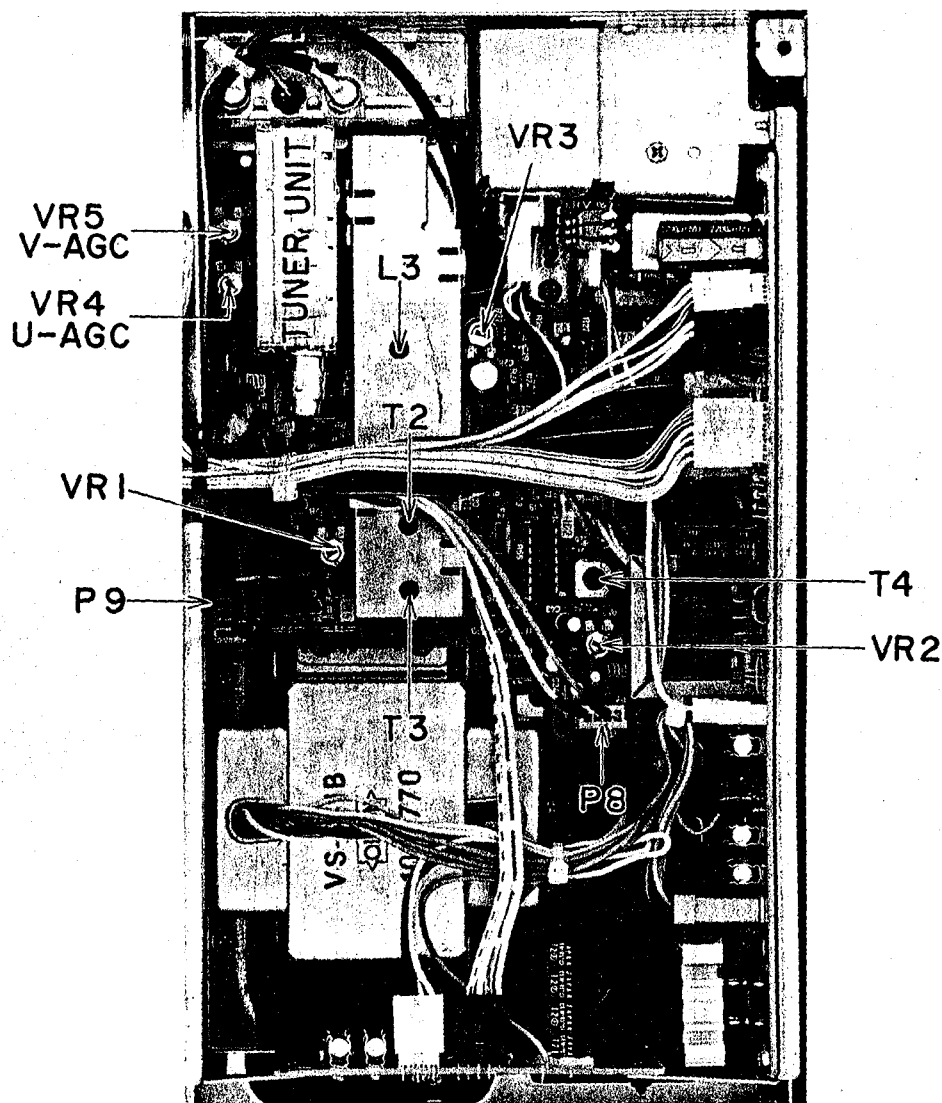


Fig. 131

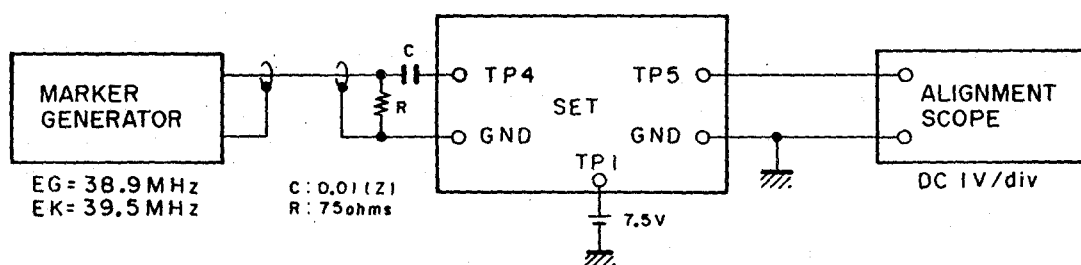


Fig. 132

## 5. TUNER ADJUSTMENT

Since the adjustment of the Tuner P.C Board requires a special jig, avoid touching the adjustment point. But should any adjustment become necessary, use the following adjustment method.

### 5-1. Tank Coil Adjustment

- 1) Apply 50 mVp-p in IF frequency (EG = 38.9 MHz, EK = 39.5 MHz) to TP4 (IF terminal) on the Tuner P.C Board.
- 2) Connect the alignment scope to TP5 (intersection between L4 and R16).
- 3) Apply DC 7.5V to TP1 (IF AGC).
- 4) Adjust T2 so that the DC voltage appearing on the alignment scope will be minimum.

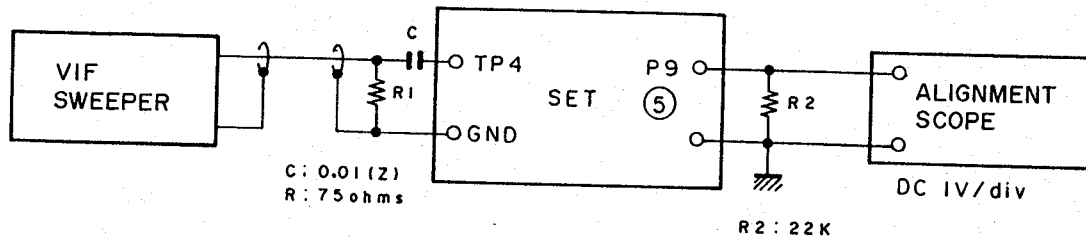


Fig. 133

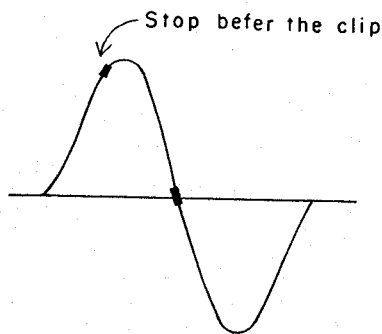


Fig. 134

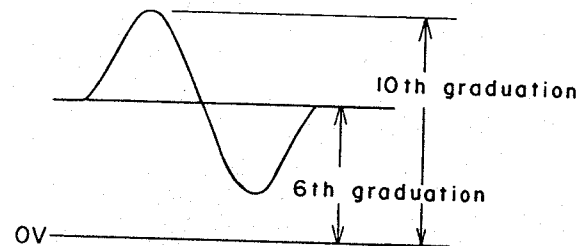


Fig. 135

## 5-2. AFC Adjustment

- 1) Connect VIF sweeper output 70 dB to the tuner IF (TP4).
- 2) Connect the alignment scope to the AFC terminal (Pin ⑤ of P9).
- 3) Make sure that VR1 is in the center, give an optional size to the waveform with the IF AGC volume, and make approximate adjustment with T3 so that the marker will be positioned at 6th graduation of the alignment scope.
- 4) Stop with IF AGC volume before the waveform is clipped (Fig. 134).
- 5) Stop with VR1 before the waveform is clipped.

- 6) Adjust with T3 so that the marker (EG = 38.9 MHz, EK = 39.5 MHz) will be at 6th graduation of the alignment scope. (Fig. 135).

## 5-3. VIF Adjustment

- 1) Apply VIF sweeper output 70 dB to TP4 (IF).
- 2) Connect the emitter of TR2 to the alignment scope.
- 3) Connect dummy resistors of 100 ohms to both ends of the tank coil (TP2, TP3).
- 4) Set the alignment scope to 10th graduation by means of the IF AGC volume and adjust the marker position as shown in Fig. 137 (a) and (b).

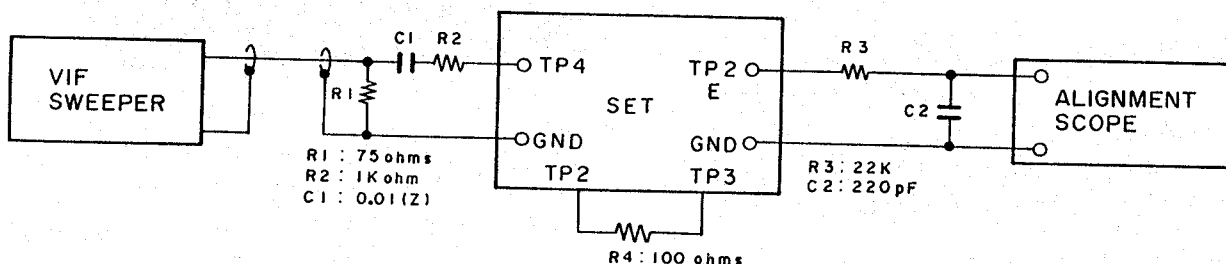


Fig. 136

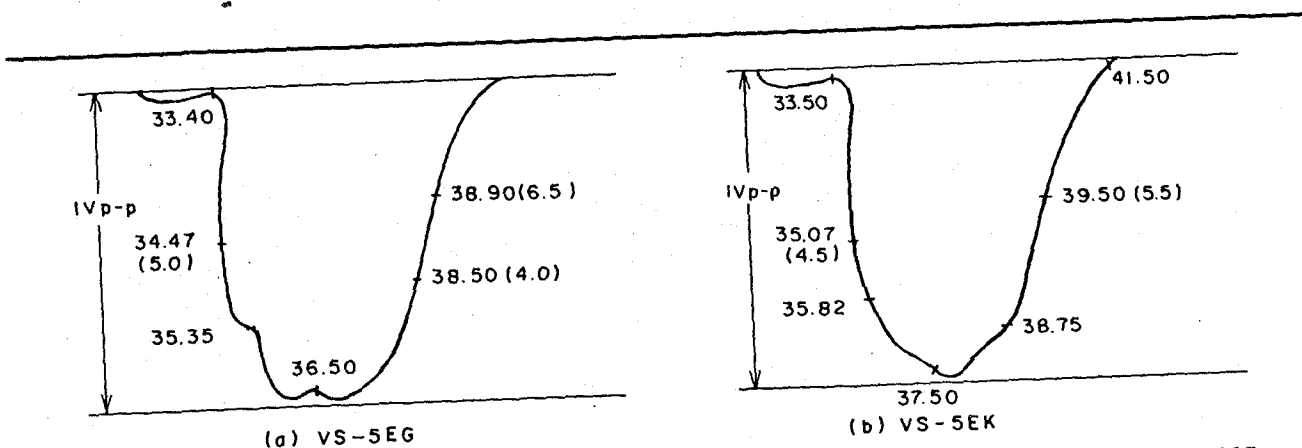


Fig. 137

#### 5-4. SIF Adjustment

- 1) Apply DC 6.0V to Pin ⑥ of P9.
- 2) Connect an AC voltmeter and a distortion meter to Pin ③ of P8.
- 3) Connect an oscilloscope to Pin ① of P8.
- 4) Add the following RF signals to ANT IN.
 

|          |                      |         |
|----------|----------------------|---------|
| EG model | VHF 12CH (color bar) | } 58 dB |
|          | UHF 50CH (Philips)   |         |
| EK model | UHF 30CH (color bar) |         |
- 5) Receive 12CH (color bar), turn AFC ON and OFF with the tuning knob to adjust the waveform to the extent that the size will not change, and turn AFC ON. (For EK model, adjust with UHF 30CH).
- 6) Turn VR2 fully anticlockwise, and adjust with T4 so that the reading of the AC voltmeter will be maximum and that the distortion factor will be minimum.
- 7) Adjust with VR2 so that the reading of the AC voltmeter will be -17 dB.

#### 5-5. Video Out Adjustment

Under the aforementioned condition, adjust with VR3 so that the video signal level of the oscilloscope will be 1 Vp-p.

#### 5-6. RF AGC Adjustment

- 1) Under the aforementioned condition, connect a digital voltmeter to the AGC terminal (TP-5).
- 2) Receive 12CH (color bar) and adjust with VR5 so that DC 6.5V  $\pm$  0.2V is achieved (EG model).
- 3) Receive 50CH (Philips), and adjust with VR4 so that DC 6.5V  $\pm$  0.2V is achieved (EG model).
- 4) Receive 30CH (color bar) and adjust with VR4 so that DC 6.5V  $\pm$  0.2V is achieved (EK model).

#### 6. 38 kHz TUNING COIL ADJUSTMENT (REMOTE CONTROL)

- 1) Connect an oscilloscope to TP.
- 2) Keep pushing the PAUSE/STILL button on the remote control unit, and observe the waveform at TP.
- 3) Change the direction of the remote control unit to decrease the input to the detector as much as possible (for example by transmitting toward the wall and receiving the reflected wave).

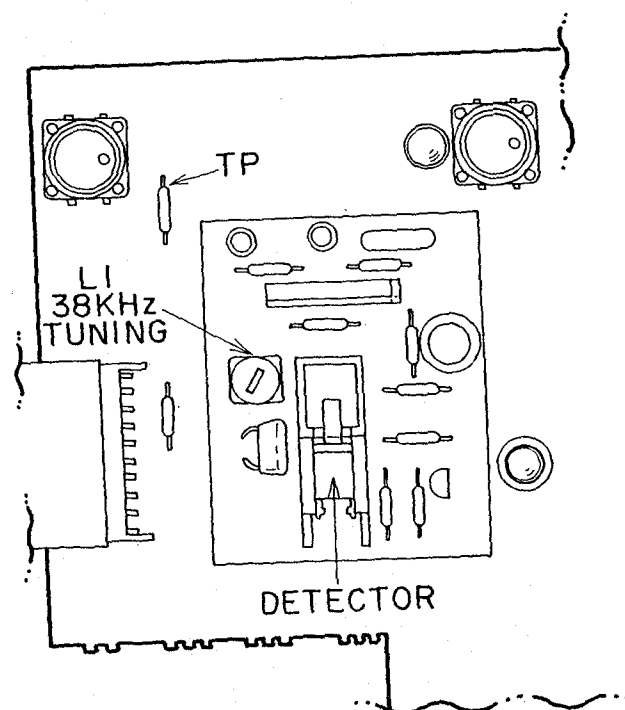


Fig. 138 Display P.C Board

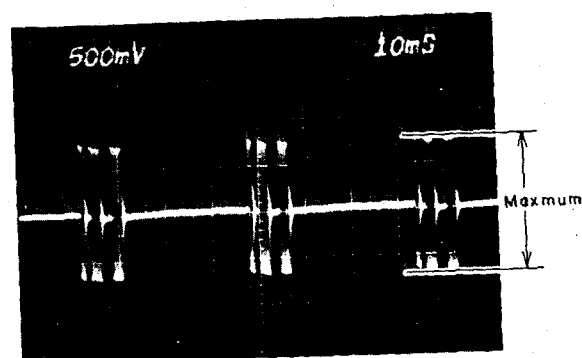


Fig. 139

- 4) Adjust L1 so that the amplitude of the waveform at TP increases to the maximum.

**NOTE:** If the waveform amplitude remains unchanged when L1 is turned, it is because the input level is so high as to cause the receiving circuit's AGC to work. In this case, adjust after reducing the input to the detector.

# XI. VARIOUS WAVEFORMS AT EACH TEST POINT

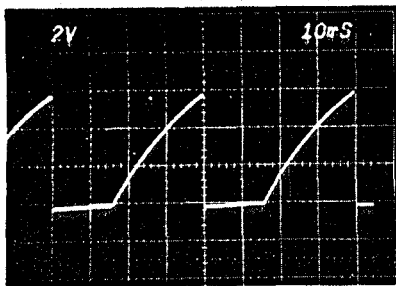
- NOTES: 1. All the waveforms are measured using the VS-5EG.
2. Use the Color Bar Tape (TF-510CB) as the playback tape and the Color Bar Signal 1 Vp-p from SSG as the input during recording.
3. If not specially instructed take the wave-

form when the oscilloscope is in the AC Mode.

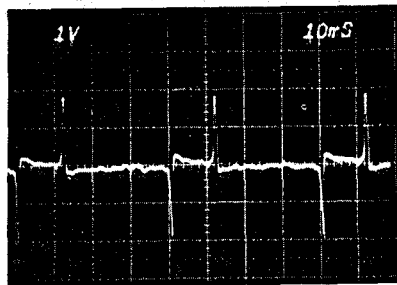
4. Showing the Volt/cm for left upper side figure and Time/cm for right upper side figure on the waveform photos.  
(For example: making an ofservation at TP1 under 2V/cm, 10mS/cm condition).

## 1. SERVO P.C BOARD

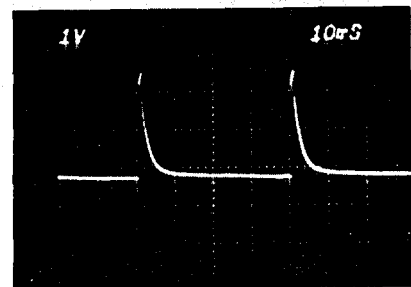
TP1 (PB, REC)



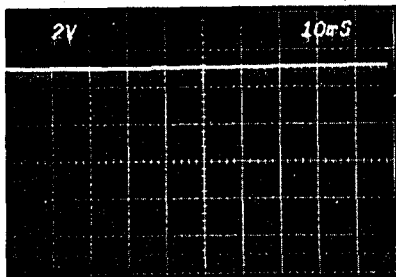
TP2 (PB)



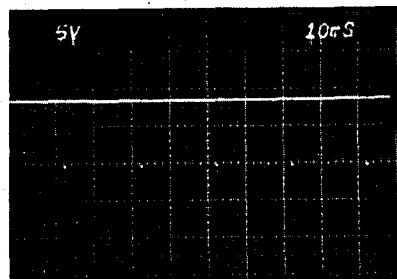
TP2 (REC)



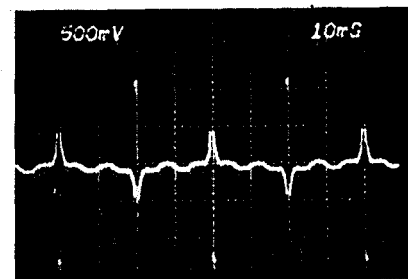
TP3 DC (PB, REC)



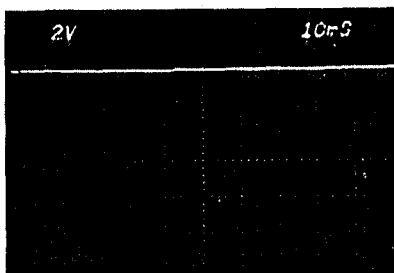
TP4 (PB, REC)



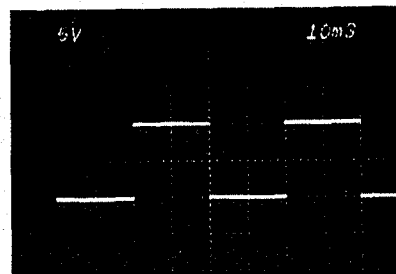
TP5 (PB, REC)



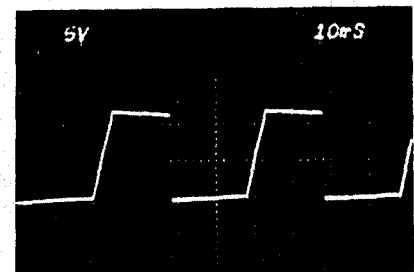
TP6 DC (PB, REC)



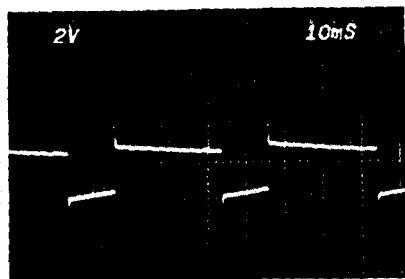
TP7 (PB, REC)



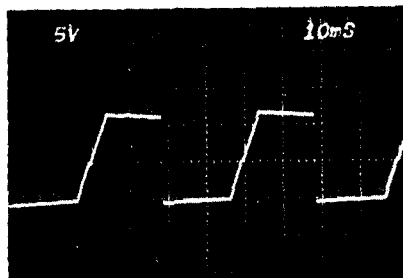
CC1 (PB, REC)



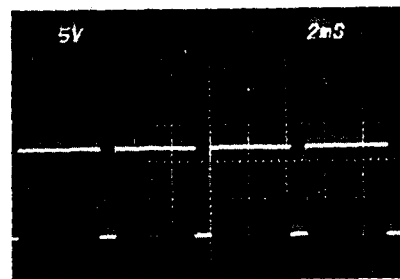
CC2 (REC)



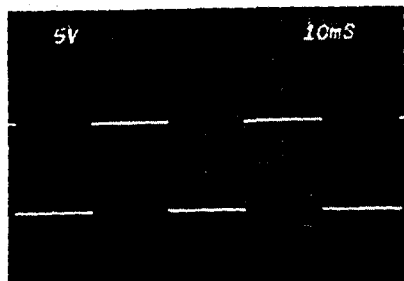
CC3 (PB, REC)



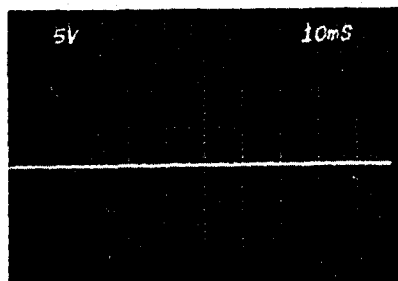
CC4 (PB, REC)



CC5 (PB, REC)

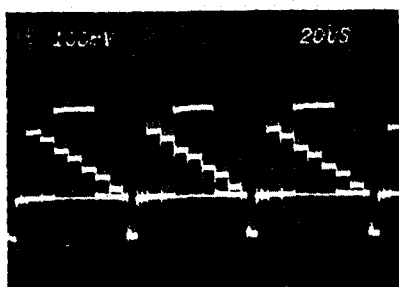


CC6 (PB)

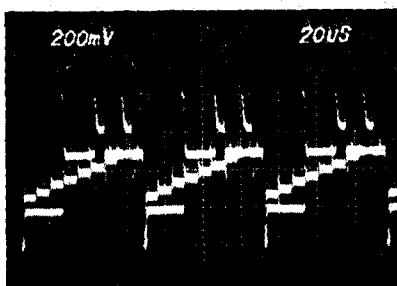


## 2. VIDEO P.C BOARD

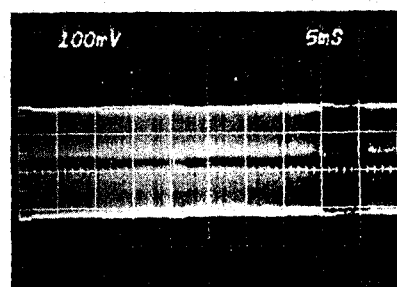
TP1 (EE, PB)



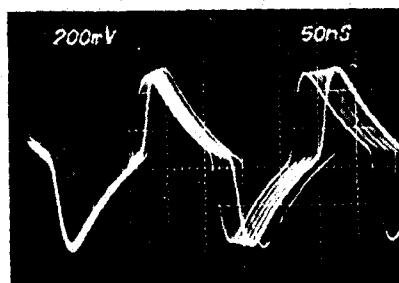
TP2 (EE)



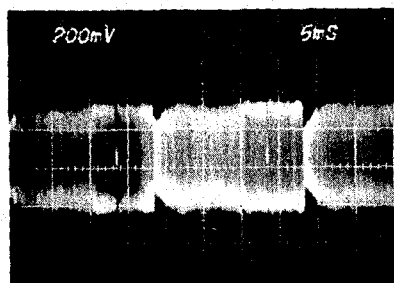
TP3 (REC)



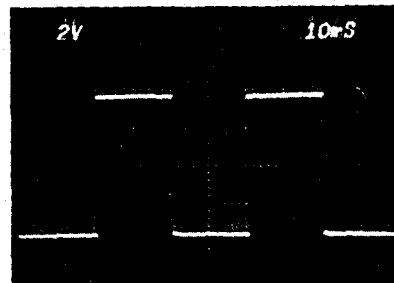
TP3 (REC)



TP6 (PB)

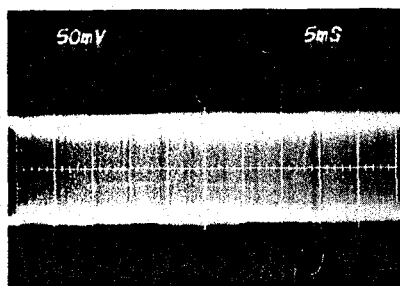


TP7 (PB, REC)

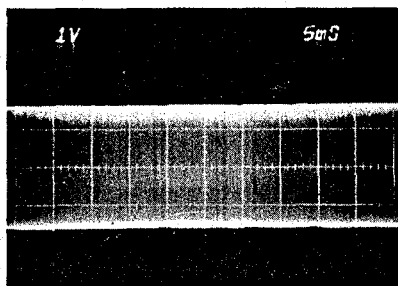




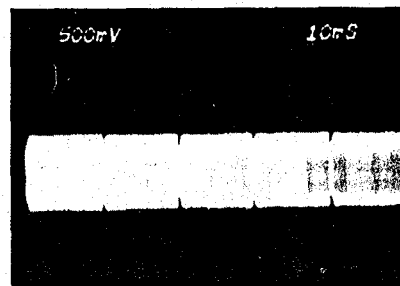
TP8, TP10 (REC)



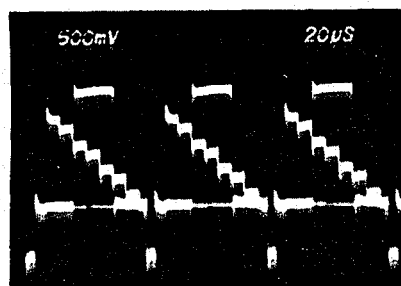
TP9 (REC)



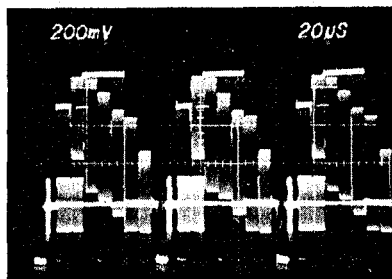
TP11 (PB)



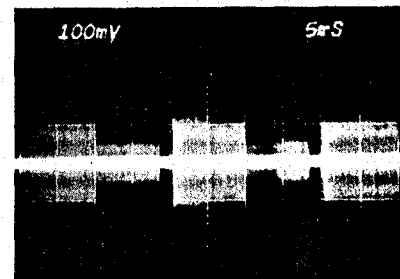
TP12 (PB)



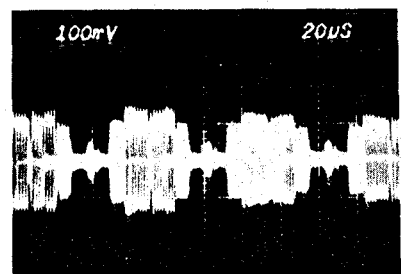
TP13 (EE, PB)



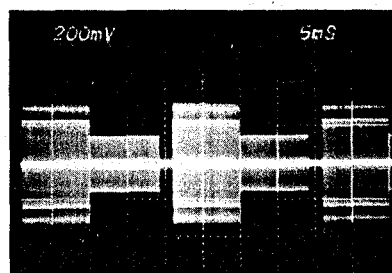
TP21 (PB)



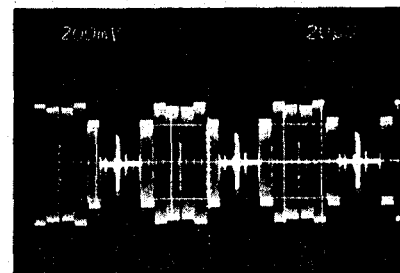
TP21 (PB)



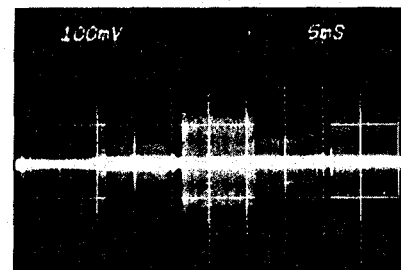
TP22 (REC)



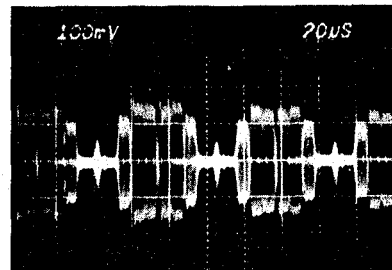
TP22 (REC)



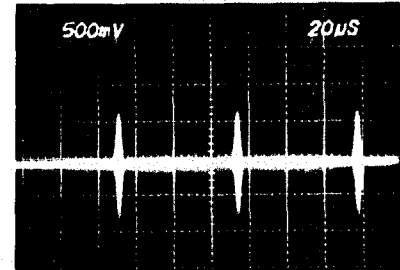
TP24 (PB)



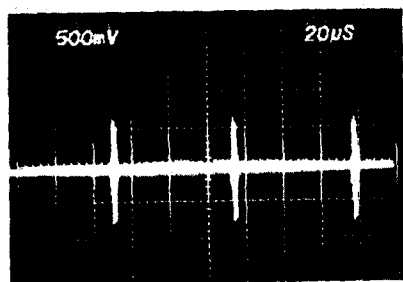
TP24 (PB)



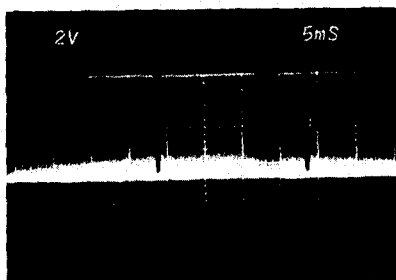
TP25 (PB)



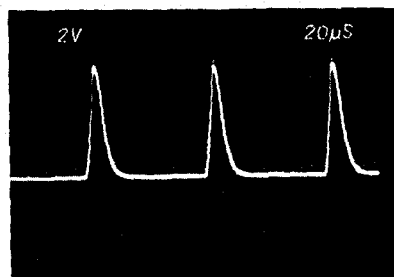
TP25 (EE)



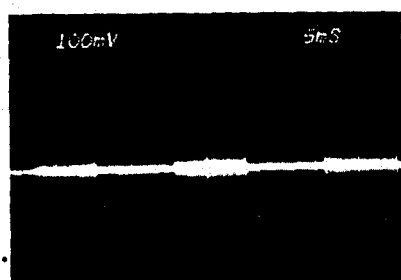
TP26 (PB, REC)



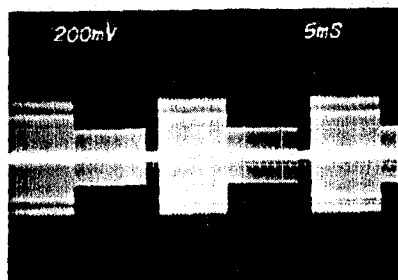
TP26 (PB, REC)



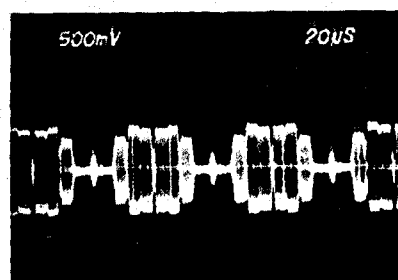
TP27 (PB)



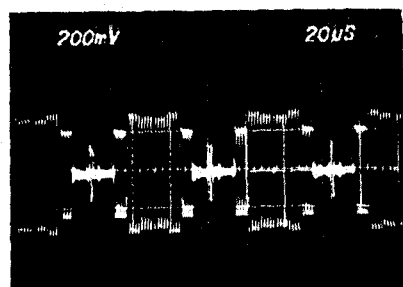
TP28 (PB, REC)



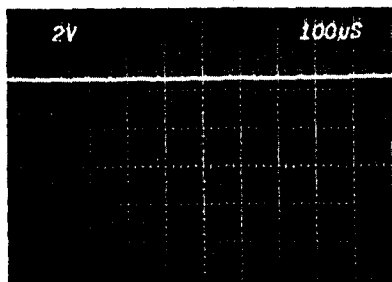
TP28 (PB)



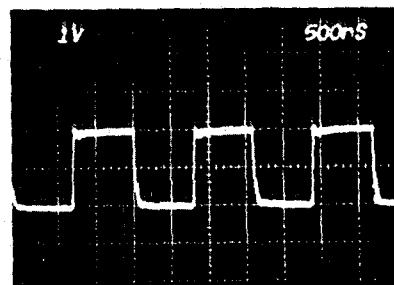
TP28 (REC)



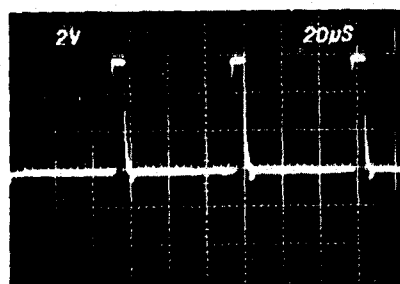
TP31 DC (EE, PB)



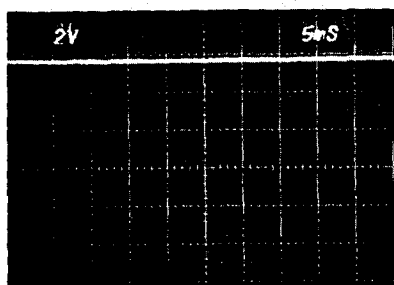
TP32 (EE, PB)



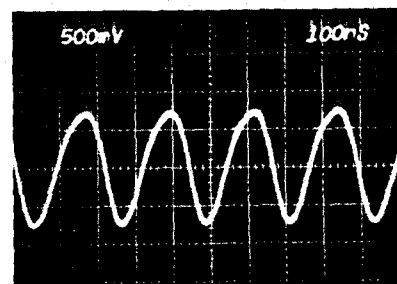
TP33 (EE, PB)



TP34 DC (EE, PB)



TP35 (PB)

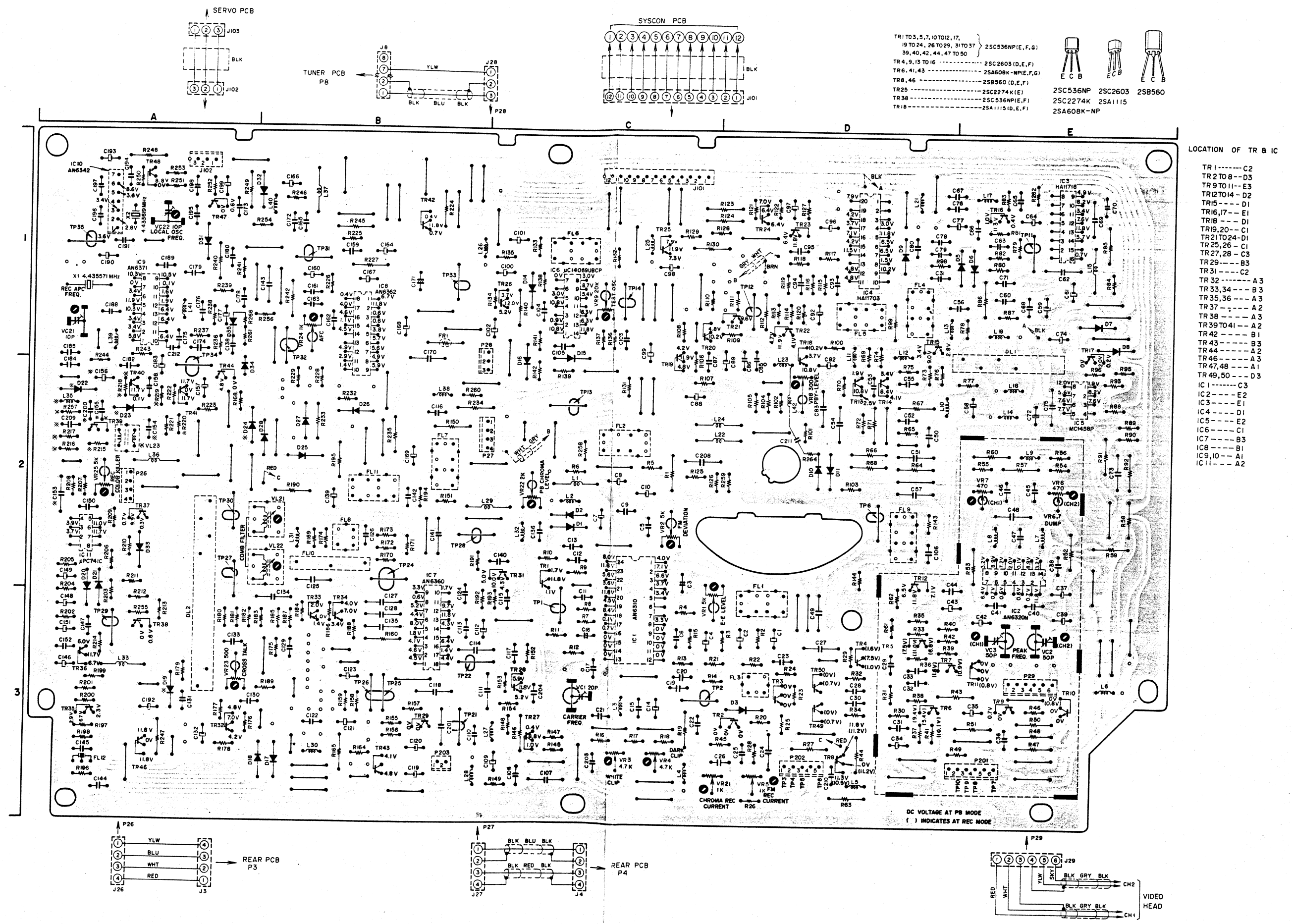


## XII. P.C BOARD TITLES AND IDENTIFICATION NUMBERS

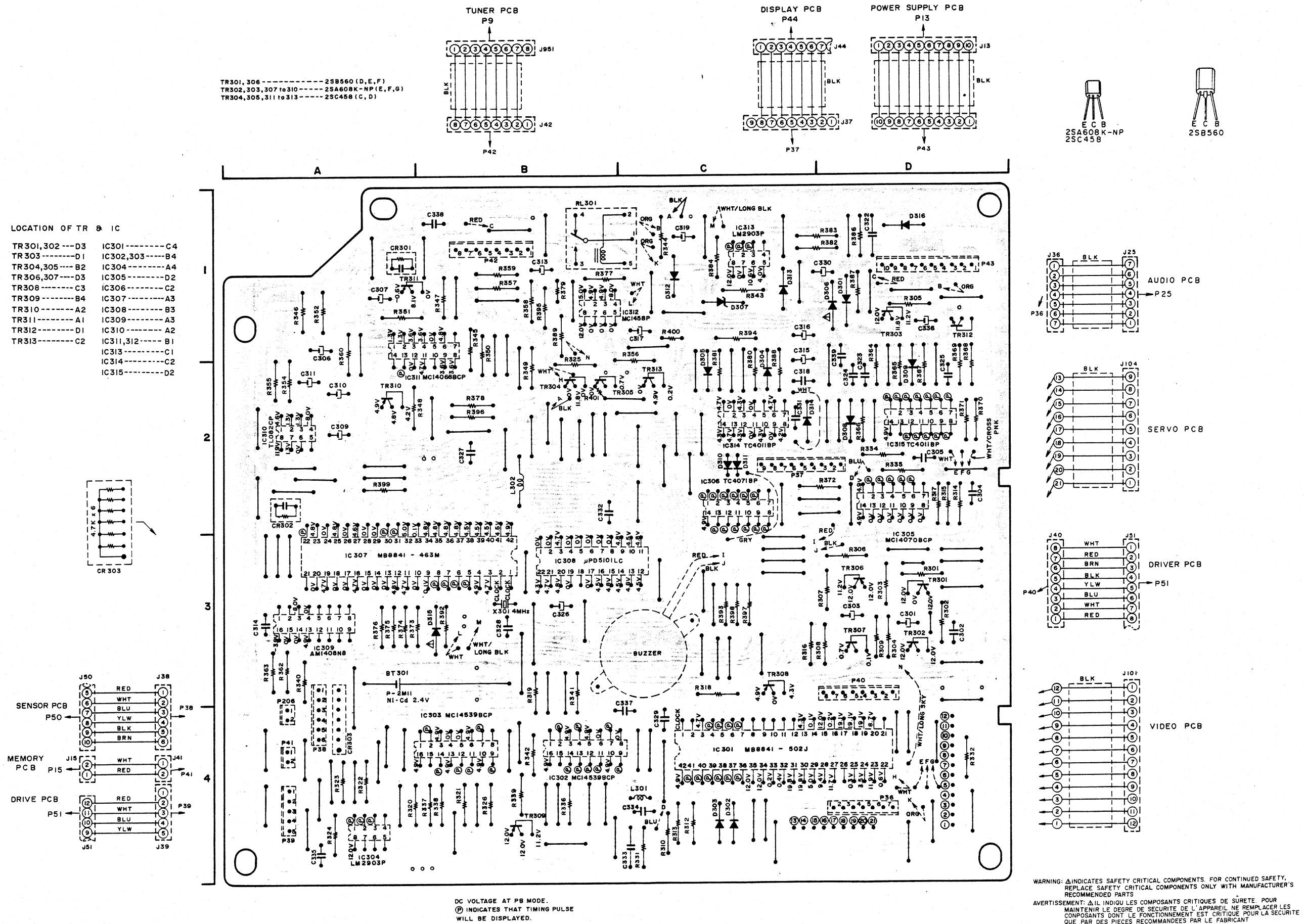
| P.C Board Title         | P.C Board Number |
|-------------------------|------------------|
| Video P.C Board         | V1004A5420       |
| Audio P.C Board         | V1004A5350       |
| Servo P.C Board         | V1004A5340       |
| Syscon P.C Board        | V1004A5341       |
| Display P.C Board       | V1004A5440       |
| Drive P.C Board         | V1004B5360       |
| Capstan Motor P.C Board | V1004B5491       |
| Drum Motor P.C Board    | V1004B5490       |
| Rear P.C Board          | V1004C5390       |
| Mic P.C Board           | V1004C5380       |
| Memory P.C Board        | V1004C5381       |
| Sensor P.C Board        | V1004C5370       |
| Audio Head P.C Board    | V1004D5410       |
| Full Erase P.C Board    | V1004D5411       |
| Motor Filter P.C Board  | V1004D5400       |
| CM Filter P.C Board     | V1004D5500       |
| Power Supply P.C Board  | KA240178         |
| Tuner P.C Board         |                  |
| Power Sub P.C Board     |                  |
| TR P.C Board            |                  |
| RS SW P.C Board         | V1004C5371       |
| SW A P.C Board          | V1004C5372       |
| SW B P.C Board          | V1004C5373       |
| EJ.S SW P.C Board       | V1004C5374       |
| Lower Drum P.C Board    | VS-8068          |
| Upper Drum P.C Board    | VS-8012          |

# XIII. COMPOSITION OF VARIOUS P.C BOARDS

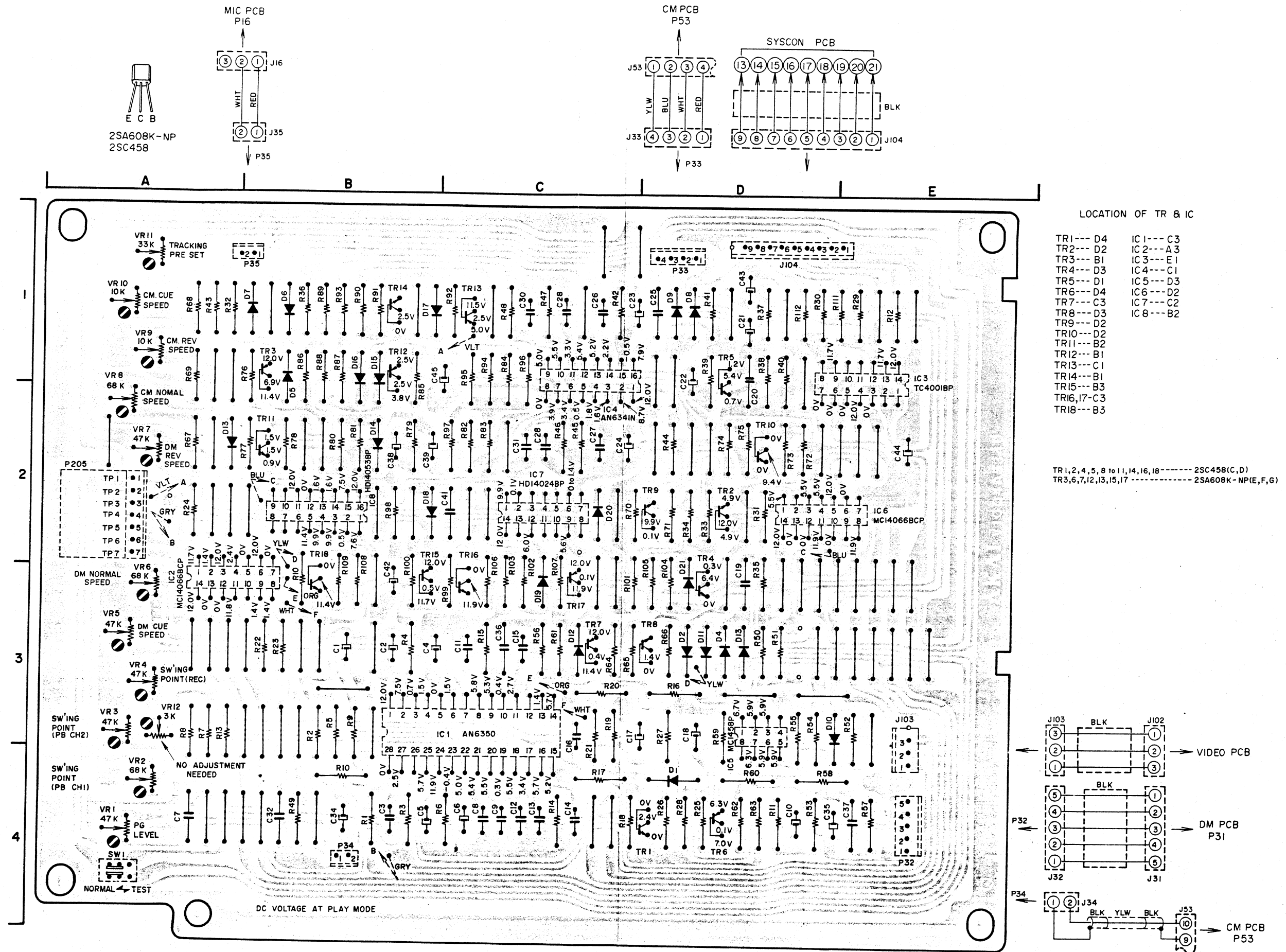
## 1. VIDEO P.C BOARD V1004A5420 (2ED)



## 2. SYSCON P.C BOARD V1004A5341 (3ED)

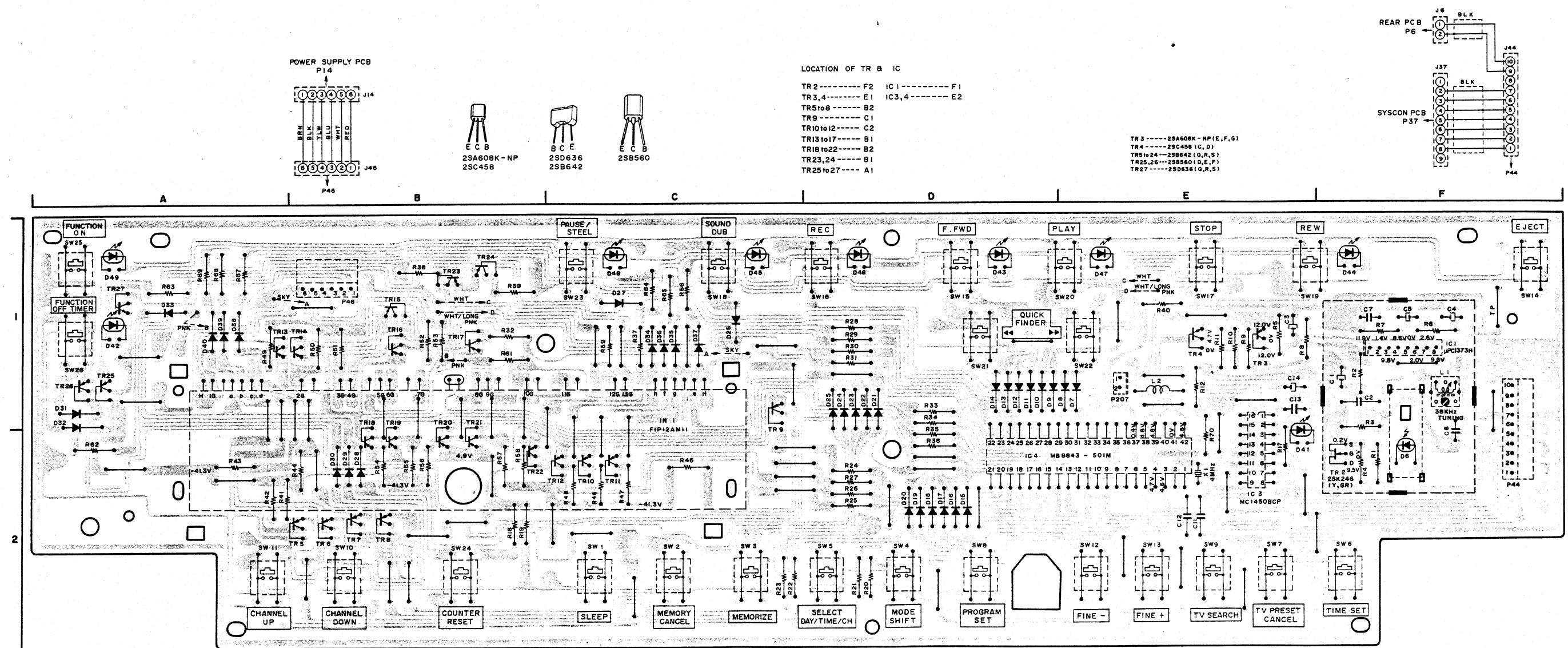


### 3. SERVO P.C BOARD V1004A5340

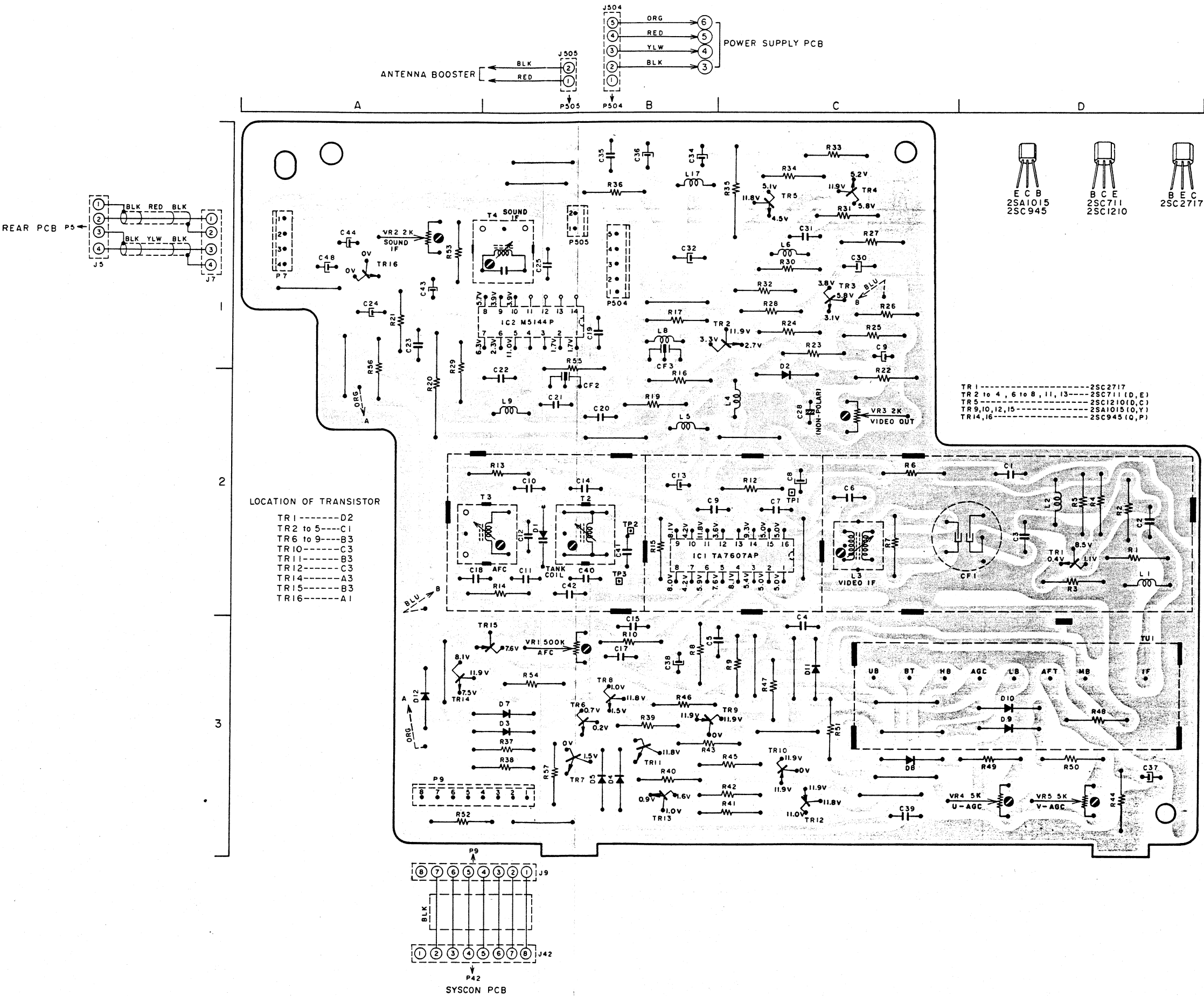




#### 4. DISPLAY P.C BOARD V1004A5440 (4ED)

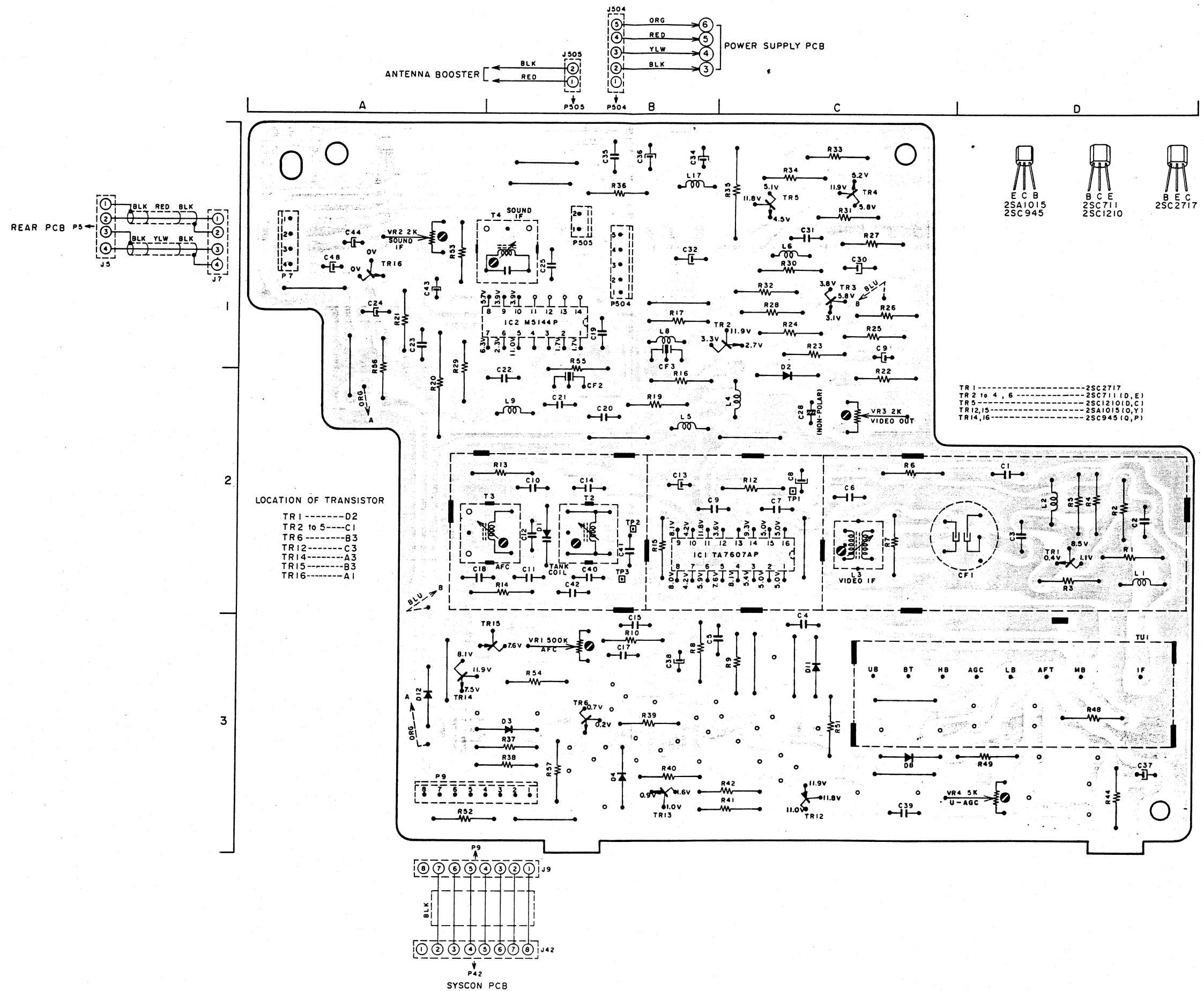


5. TUNER P.C BOARD (EG)

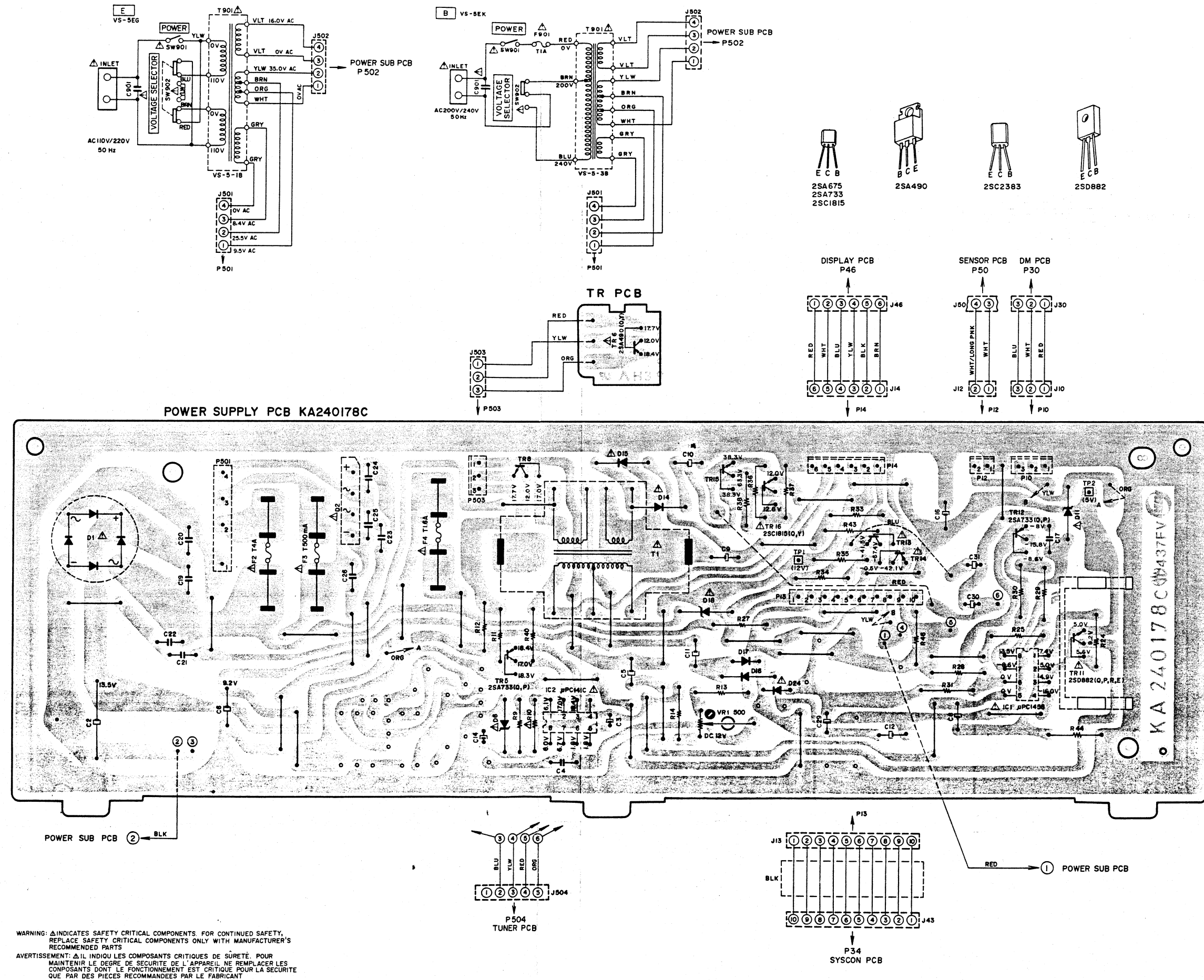




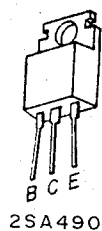
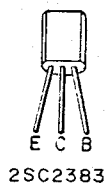
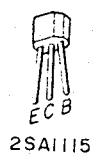
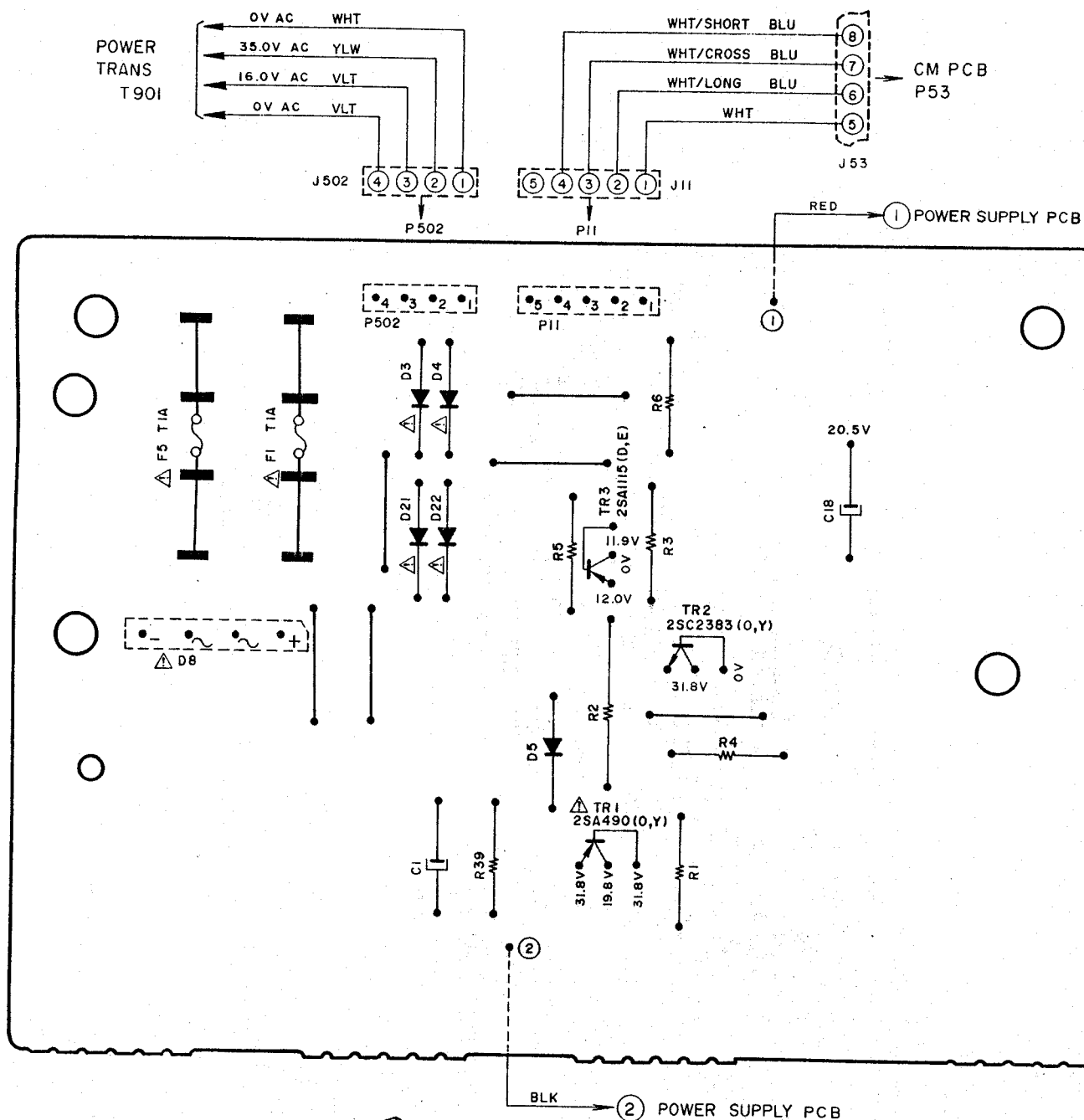
# 6. TUNER P.C BOARD (EK)



# 7. POWER SUPPLY P.C BOARD KA240178C and TR P.C BOARD

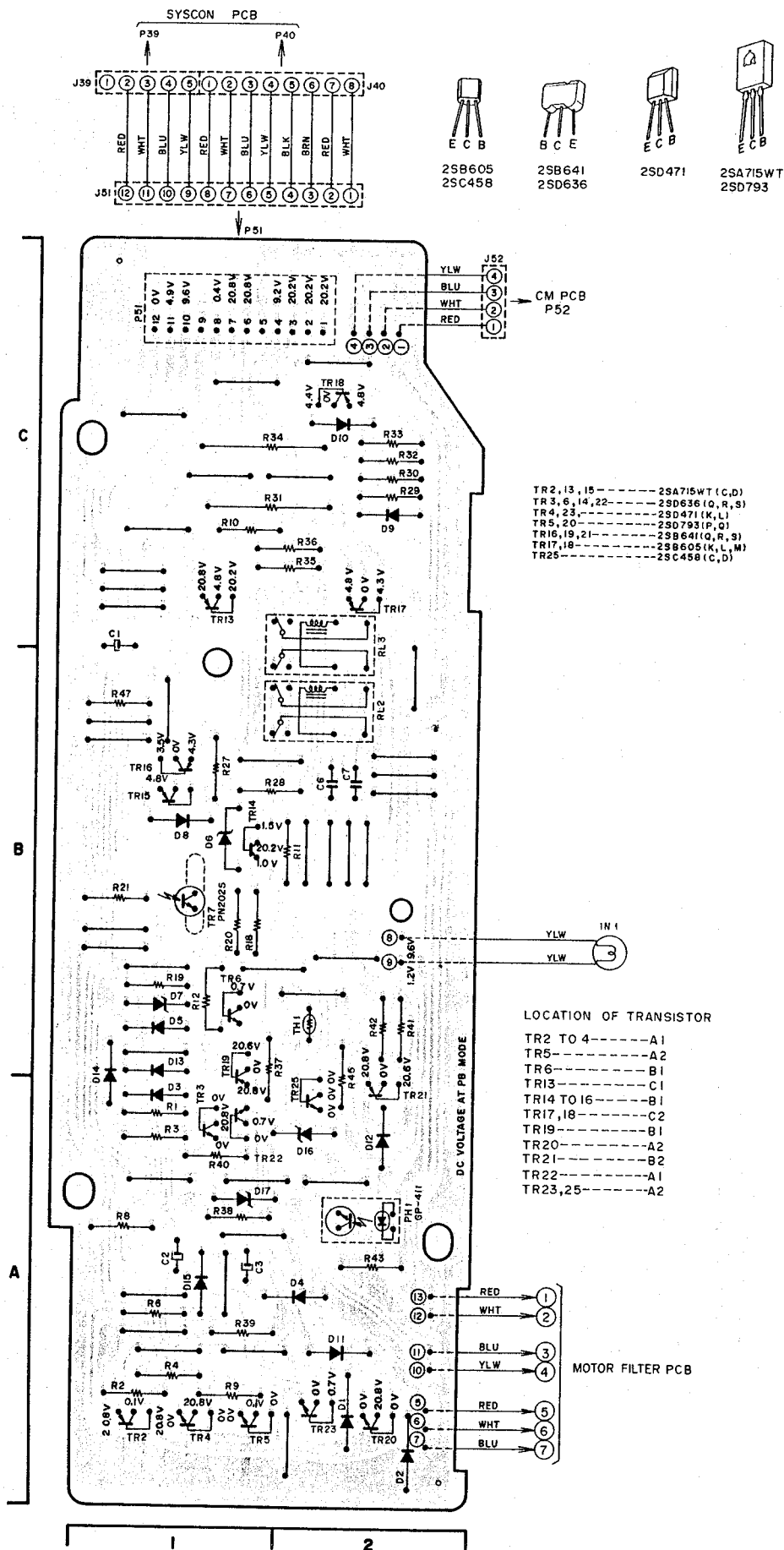


## 8. POWER SUB P.C BOARD

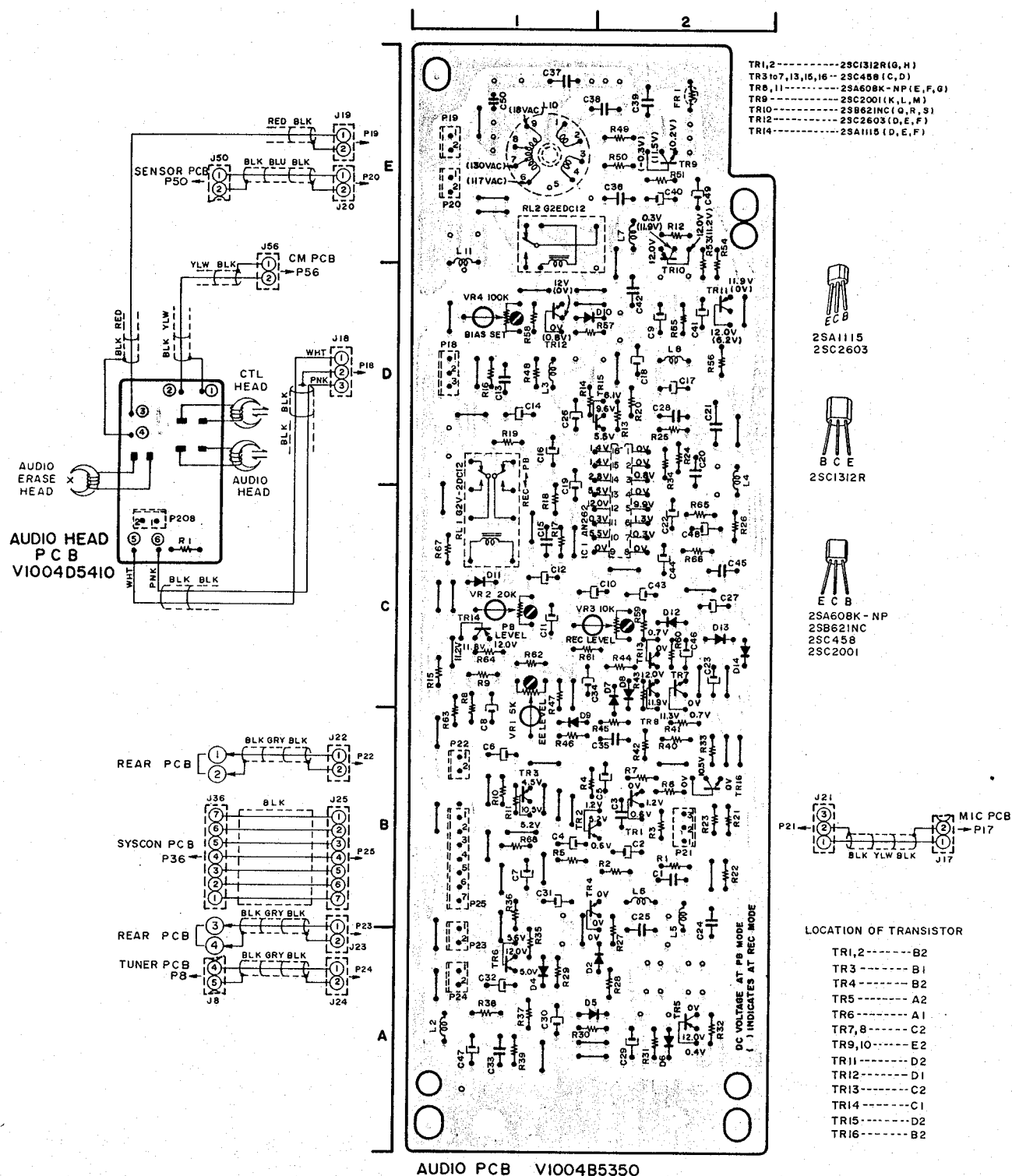


WARNING: Δ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.  
 AVERTISSEMENT: Δ IL INDIQUE LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR MAINTENIR LE DEGRÉ DE SÛRETÉ DE L'APPAREIL, NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SÛRETÉ QUE PAR DES PIÈCES RECOMMANDÉES PAR LE FABRICANT.

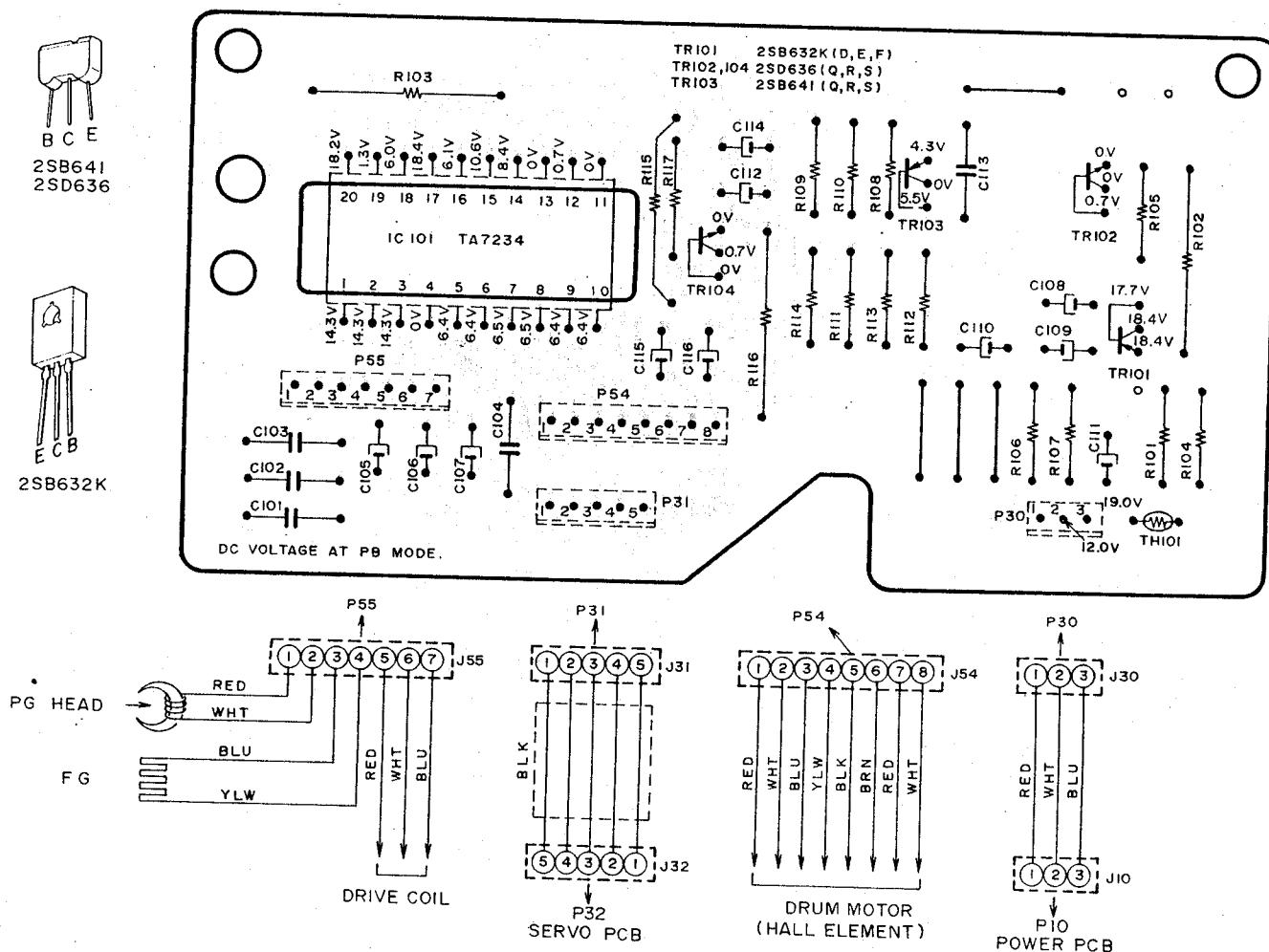
9. DRIVE P.C BOARD V1004B5360



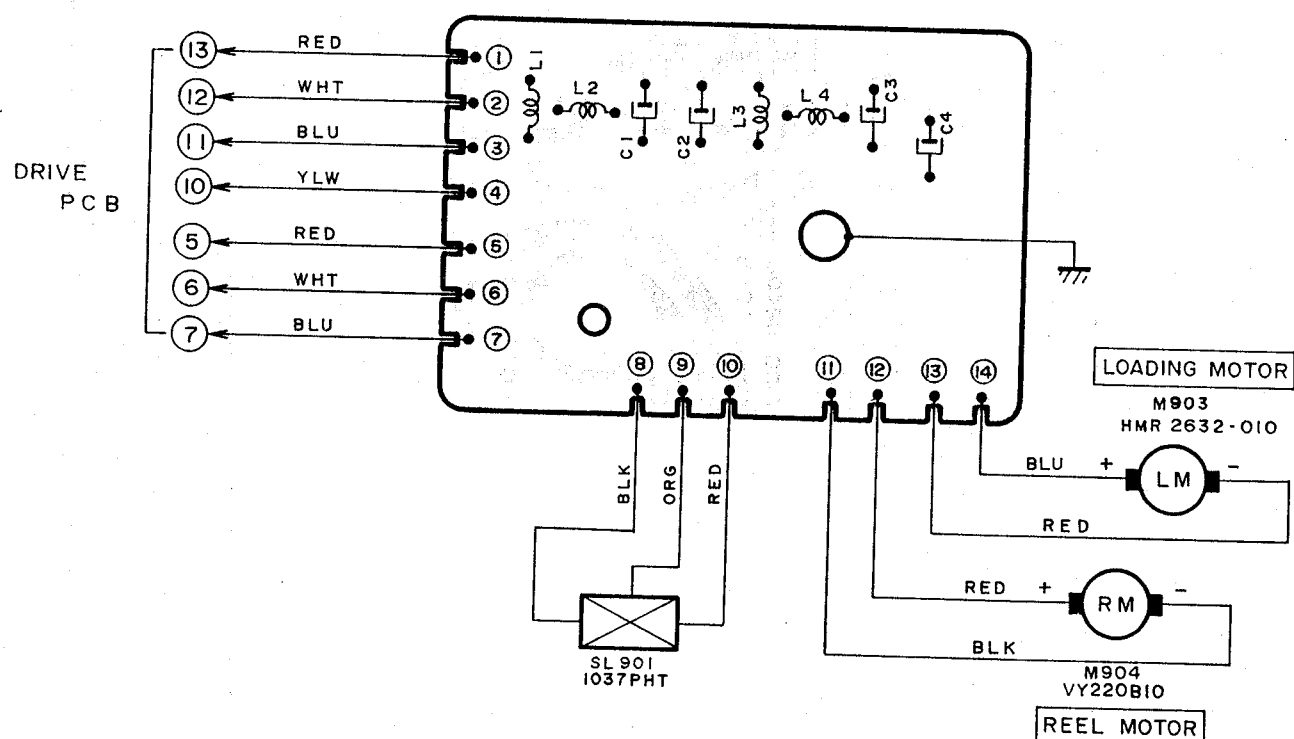
**10. AUDIO P.C BOARD V1004B5350 (3ED) and AUDIO HEAD P.C BOARD V1004D5410**



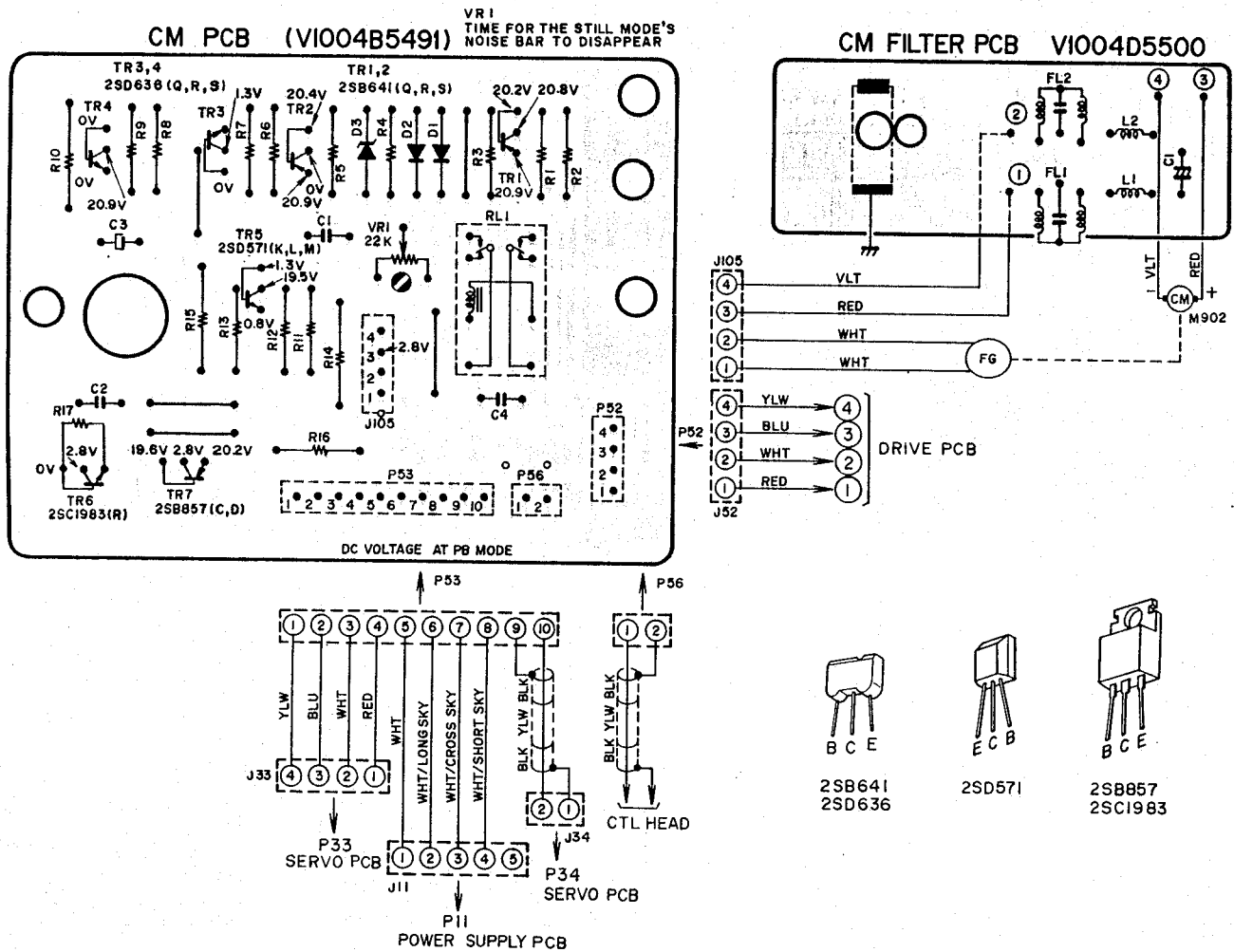
## 11. DRUM MOTOR P.C BOARD V1004B5490



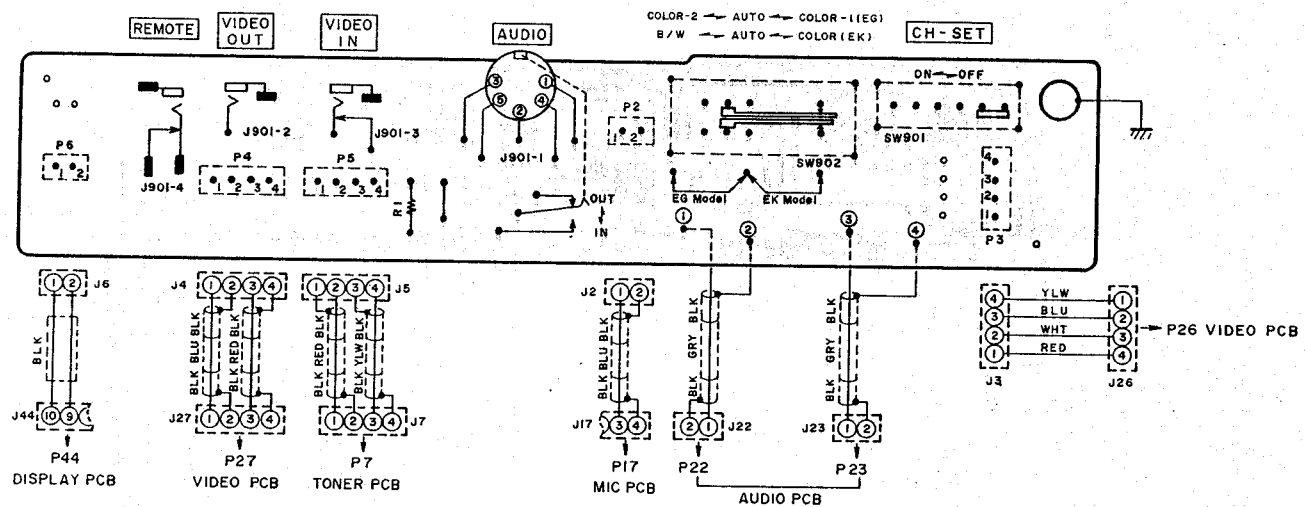
## 12. MOTOR FILTER P.C BOARD V1004D5400 (2ED)



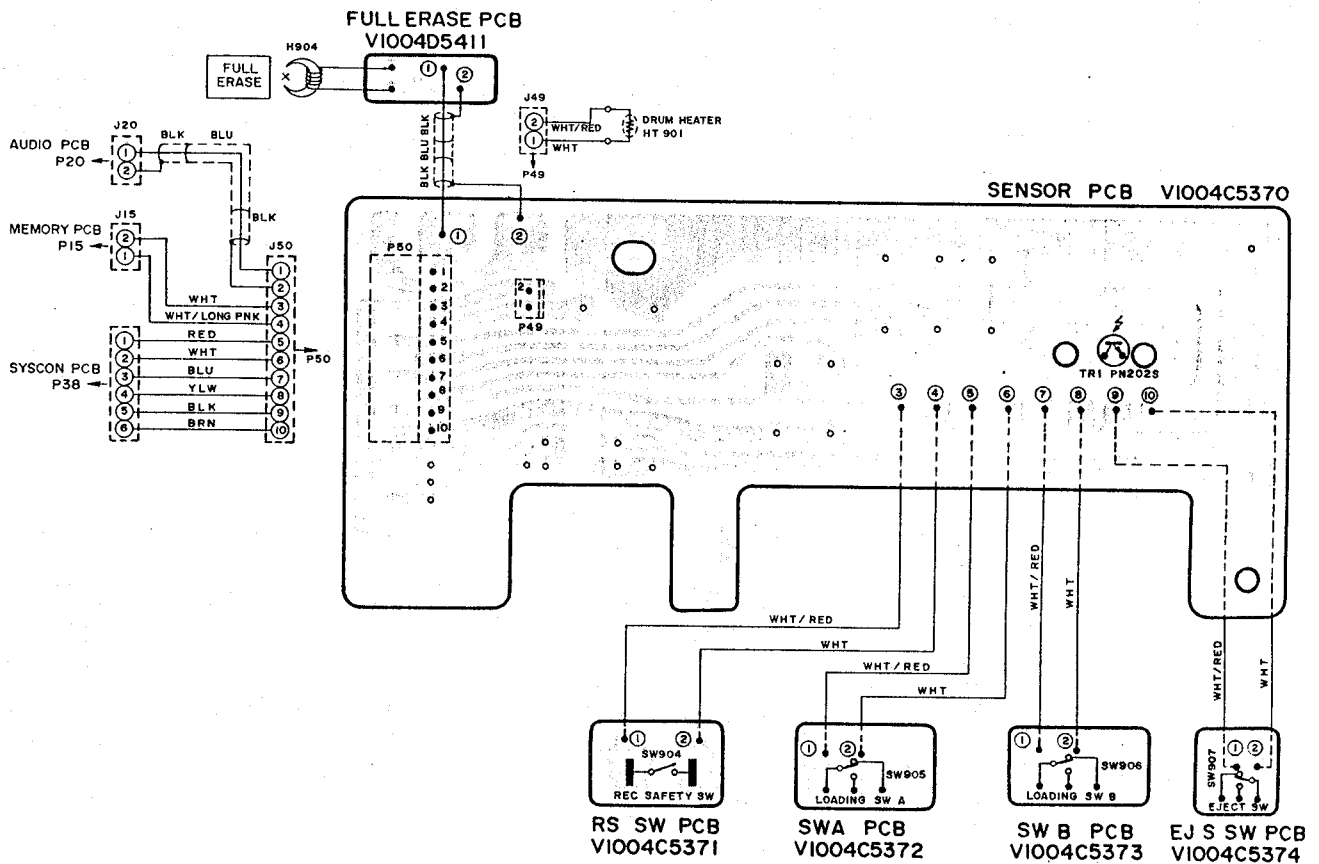
### 13. CM P.C BOARD V1004B5491 and CM FILTER P.C BOARD V1004D5500



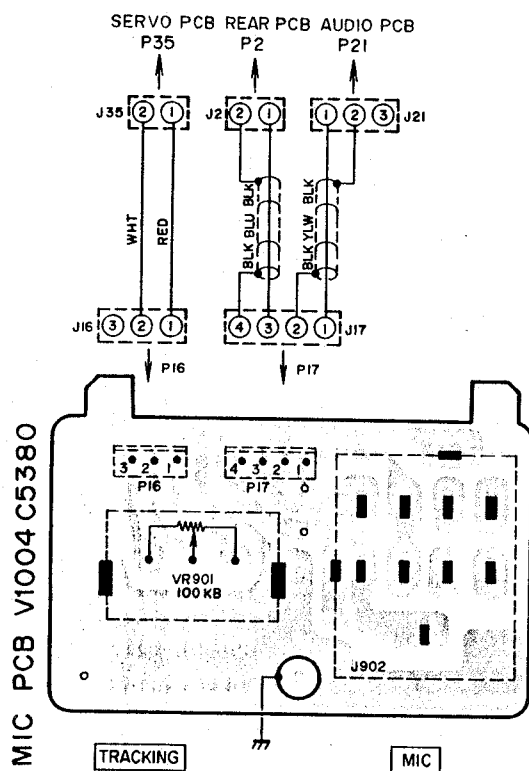
### 14. REAR P.C BOARD V1004C5390 (2ED)



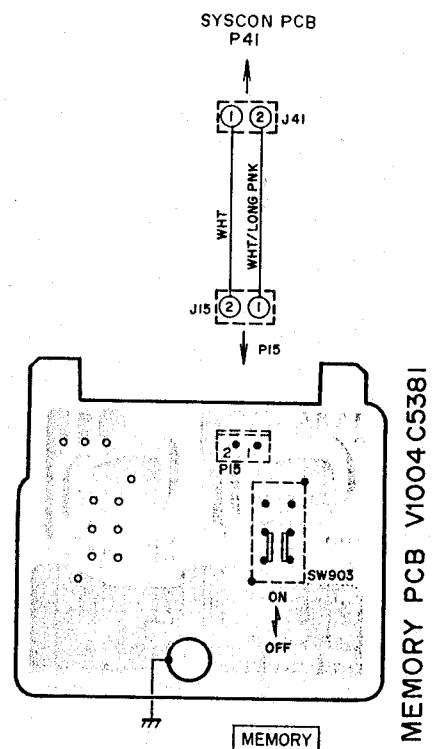
15. SENSOR P.C BOARD V1004C5370, FULL ERASE P.C BOARD V1004D5411,  
RS. SW P.C BOARD V1004C5371, SW A P.C BOARD V1004C5372, SW B P.C BOARD  
V1004C5373 and E.J.S SW P.C BOARD V1004C5374



16. MIC P.C BOARD V1004C5380

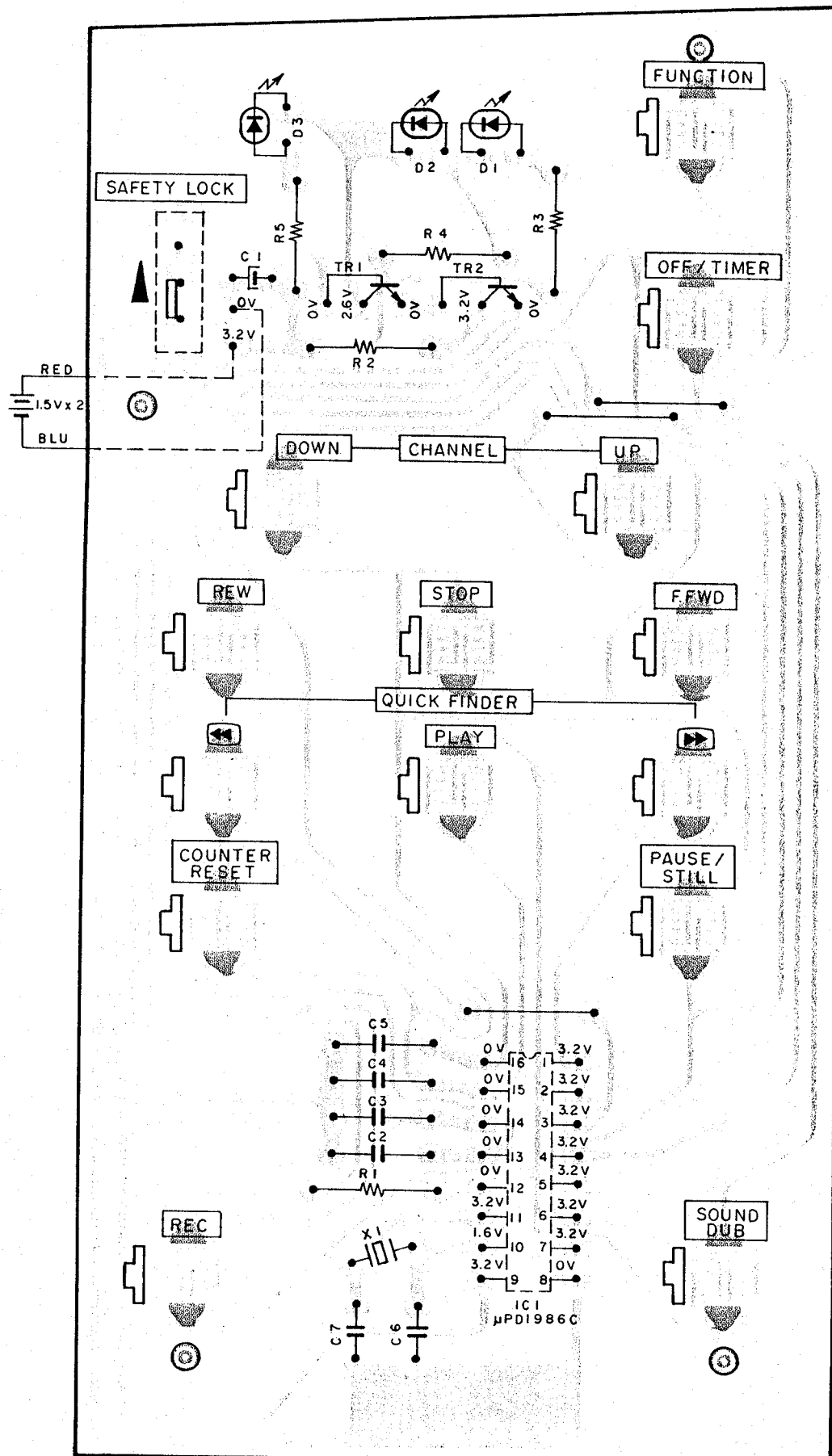


17. MEMORY P.C BOARD V1004C5381





## 18. REMOTE CONTROL UNIT RC-V5





## SECTION 2

# PARTS LIST

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Resistor and Capacitor which is not listed in this parts list, please refer to COMMON LIST FOR SERVICE PARTS.

## HOW TO USE THIS PARTS LIST

1. This parts list is compiled by various individual blocks based on assembly process.
2. When ordering parts, please describe parts number, serial number, and model number in detail.
3. How to read List

The reference number corresponds with illustration or photo number of that particular parts list.

This number corresponds with the Figure Number.  
 This number corresponds with the individual parts index number in that figure.  
 A small "x" indicates the inability to show that particular part in the Photo or Illustration.

12-115x

| Ref. No. | Parts No.                 | Description                |
|----------|---------------------------|----------------------------|
|          | <b>FLYWHEEL BLOCK #13</b> |                            |
| 12-115x  | 800425                    | Flywheel Block Assy. Comp. |
| 12-116   | 244506                    | Flywheel Only              |
| 12-117x  | 244754                    | Felt, Flywheel             |
| 12-118   | 251324                    | Main Metal Case            |
| 12-119   | 253080                    | Main Metal                 |

4. The symbol numbers shown on the P.C. Board list can be matched with the Composite Views of Components of the Schematic Diagram or Service Manual.
5. Please utilize separate "Common List for Service Parts" for Resistor Parts orders.
6. The shape of the parts and parts name, etc. can be confirmed by comparing them with the parts shown on the Electrical Parts Table of P.C. Board.
7. Both the kind of part and installation position can be determined by the Parts Number. To determine where a parts number is listed, utilize Parts Index at end of Parts List.  
 It is necessary first of all to find the Parts Number. This can be accomplished by using the Reference Number listed at right of parts number in the Parts Index. (meaning of ref. no. outlined in Item 3 above).
8. Utilize separate "Price List for Parts" to determine unit price. The most simple method of finding parts Price is to utilize the reference number.

- CAUTION:**
1. When placing an order for parts, be sure to list the parts no. model no., and description. There are instances in which if any of this information is omitted, parts cannot be shipped or the wrong parts will be delivered.
  2. Please be careful not to make a mistake in the parts no. If the parts no. is in error, a part different from the one ordered may be delivered.
  3. Because parts number and parts unit supply in the Preliminary Service Manual (Basic Parts List) may be partially changed, please use this parts list for all future reference.

**WARNING:** **⚠** INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

**AVERTISSEMENT:** **⚠** IL INDIQU LES COMPOSANTS CRITIQUES DE SURETE. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT.

## 1. RECOMMENDED SPARE PARTS

Because, if the parts listed below are on hand, almost any repair can be accomplished, we suggest that you stock these Recommended Spare parts Items.

| REF. NO. | PARTS NO.    | DESCRIPTION                 | REF. NO. | PARTS NO. | DESCRIPTION                    |
|----------|--------------|-----------------------------|----------|-----------|--------------------------------|
| 1-1      | BHV1004A280A | UPPER DRUM BLK VS-5EG       | 1-71     | EI326159  | IC LM2903P                     |
| 1-2      | BM324475     | MOTOR DDV5-1C               | 1-72     | EI324000  | IC MB8841 463M                 |
| 1-3      | BM325491     | MOTOR FG DMF-4907A          | 1-73     | EI323995  | IC MB8841 502J                 |
| 1-4      | BM325617     | MOTOR MXN-12AD08B           | 1-74     | EI330451  | IC MB8843 501M                 |
| 1-5      | BM325314     | MOTOR VY220B10              | 1-75     | EI324250  | IC MC14050BCP                  |
| 1-6      | BR317908     | SUPPLY REEL TABLE BLK       | 1-76     | EI304475  | IC MC14066BCP                  |
| 1-7      | BR327789     | TU REEL TABLE ASSY          | 1-77     | EI304475  | IC MC14066BCP                  |
| 1-8      | BT705472     | Δ TRANS POWER KX590176      | 1-78     | EI304475  | IC MC14066BCP                  |
| 1-9      | BT705526     | Δ TRANS POWER VS-5-1B (EG)  | 1-79     | EI324117  | IC MC14069UBCP                 |
| 1-10     | BT705527     | Δ TRANS POWER VS-5-3B (EK)  | 1-80     | EI330392  | IC MC14070BCP                  |
| 1-11     | BV330111     | ANT BOOSTER YBC1-001        | 1-81     | EI319496  | IC MC14539BCP                  |
| 1-12     | BV327845     | EJECTER ASSY                | 1-82     | EI330392  | IC MC1458P                     |
| 1-13     | BVV1004A230A | LOADING BLK VS-5EG          | 1-83     | EI704201  | IC M5144P                      |
| 1-14     | BVV1004A300A | LOWER DRUM BLK VS-5EG       | 1-84     | EI330431  | IC TA7234                      |
| 1-15     | BV330110     | RF CONVERTER MBK3-253 (EK)  | 1-85     | EI705494  | IC TA7607P                     |
| 1-16     | BV330109     | RF CONVERTER MDK3-253 (EG)  | 1-86     | EI313797  | IC TC4001BP                    |
| 1-17     | BVV1004A160A | ROLLER PINCH BLK VS-5EG     | 1-87     | EI304657  | IC TC4011BP                    |
| 1-18     | BV327815     | TU IDLER ASSY               | 1-88     | EI324687  | IC TC4071BP                    |
| 1-19     | ED780019     | D LED SEL1123W              | 1-89     | EI324255  | IC TL082CP                     |
| 1-20     | ED706226     | D LED SE303A INFRARED       | 1-90     | EI203040  | IC μA741CP                     |
| 1-21     | ED324943     | D LED SLP-134A RED          | 1-91     | EI330226  | IC μPC1373H                    |
| 1-22     | ED324943     | D LED SLP-134A RED          | 1-92     | EI308473  | IC μPC141C                     |
| 1-23     | ED324823     | D LED SLP-234C GRN          | 1-93     | EI301748  | IC μPC1458C                    |
| 1-24     | ED330238     | D PHOTO PH302               | 1-94     | EI780020  | IC μPD1986C                    |
| 1-25     | ED200469     | D SILICON H DS448 FA5 F10   | 1-95     | EI328692  | IC μPD5101LC                   |
| 1-26     | ED523427     | D SILICON H 1SS16           | 1-96     | EI780021  | OSC CE                         |
| 1-27     | ED557447     | D SILICON H 1S1588          | 1-97     | EI327364  | OSC X'TAL HC-33/U 4.435571 MHZ |
| 1-28     | ED309437     | D SILICON H 1S1926-M        | 1-98     | EI309878  | OSC X'TAL 4.433619 MHZ         |
| 1-29     | ED316143     | D SILICON H 1S2473HS F10    | 1-99     | EJ301513  | Δ SOCKET INLET S-16453 E 2P    |
| 1-30     | ED705467     | D SILICON M4B51-14          | 1-100    | EJ319158  | JACK PLATE VS-5 B0002          |
| 1-31     | ED705468     | D SILICON T1B4B41           | 1-101    | EJ330544  | PHONE J 3P HLJ0315-010 6.3 2T  |
| 1-32     | ED200468     | D SILICON V DS448 VB3       | 1-102    | EL330446  | PL SPL HOLDER LAMP             |
| 1-33     | ED560913     | D SILICON V 1S2473VE        | 1-103    | EM318923  | IND FL FIP12AM11 CHARACTER     |
| 1-34     | ED323979     | D SILICON W03B F12 150/1.0A | 1-104    | EO330256  | OSC CE F85-006 4MHZ            |
| 1-35     | ED306109     | D SILICON W03B 100/1.0A     | 1-105    | EO330256  | OSC CE F85-006 4MHZ            |
| 1-36     | ED705479     | D SILICON 1SV70             | 1-106    | EP318925  | RELAY POWER FBR221D006         |
| 1-37     | ED604541     | D SILICON 1S2076            |          |           | 2TR 6V                         |
| 1-38     | ED704267     | D SILICON 10E-1             | 1-107    | EP318925  | RELAY POWER FBR221D006         |
| 1-39     | ED329058     | D ZENER H HZ5 C1            |          |           | 2TR 6V                         |
| 1-40     | ED330428     | D ZENER H WZ-090            | 1-108    | EP330266  | RELAY POWER G2U-112P 1TR 12V   |
| 1-41     | ED327059     | D ZENER H WZ-100            | 1-109    | EP200175  | RELAY SIGNAL G2E 1TR 12V       |
| 1-42     | ED570521     | D ZENER H XZ-049            | 1-110    | EP327336  | RELAY SIGNAL G2V-2 2TR 12V     |
| 1-43     | ED570521     | D ZENER H XZ-049            | 1-111    | EP319333  | SOLENOID W/TAP 1037PLT 15V     |
| 1-44     | ED705470     | D ZENER HZ11C1              | 1-112    | ER705495  | FILTER CE F1024 38.9MHZ        |
| 1-45     | ED705469     | D ZENER HZ6C-2              | 1-113    | ER705496  | FILTER CE F1025 39.5MHZ        |
| 1-46     | ED323892     | PHOTO SENSOR GP-411         | 1-114    | ER705499  | FILTER CE SFE 5.5MHZ           |
| 1-47     | EE330106     | TV TUNER CBE1-002 (EK)      | 1-115    | ER705500  | FILTER CE SFE 6MHZ             |
| 1-48     | EE330292     | TV TUNER CDE1-011 (EG)      | 1-116    | ER328237  | FILTER CE SFE4.5MB 4.5MHZ      |
| 1-49     | EF354295     | Δ FUSE T 1.6AT CEE          | 1-117    | ER705501  | FILTER CE TPS 5.5MHZ           |
| 1-50     | EF375660     | Δ FUSE T 1AT CEE            | 1-118    | ER705502  | FILTER CE TPS 6MHZ             |
| 1-51     | EF375660     | Δ FUSE T 1AT CEE            | 1-119    | ER324339  | FILTER LC AP LCB-56            |
| 1-52     | EF564491     | Δ FUSE T 4AT CEE            | 1-120    | ER324375  | FILTER LC BP LCB-57 4.43MHZ    |
| 1-53     | EF375647     | Δ FUSE T 500MAT CEE         | 1-121    | ER324470  | FILTER LC BP LCB-60 4.43MHZ    |
| 1-54     | EI322365     | DL EFD-EN645A11E            | 1-122    | ER325807  | FILTER LC BP LCB-61 5.06MHZ    |
| 1-55     | EI322394     | DL EFD-JN124A11A            | 1-123    | ER324305  | FILTER LC HP LCB-53            |
| 1-56     | EI328690     | IC AM1408N8                 | 1-124    | ER324258  | FILTER LC LP LCB-51            |
| 1-57     | EI634454     | IC AN262                    | 1-125    | ER324259  | FILTER LC LP LCB-52            |
| 1-58     | EI324204     | IC AN6310                   | 1-126    | ER324309  | FILTER LC LP LCB-54            |
| 1-59     | EI321076     | IC AN6320N                  | 1-127    | ER324398  | FILTER LC LP LCB-58            |
| 1-60     | EI321604     | IC AN6341N                  | 1-128    | ER324469  | FILTER LC LP LCB-59            |
| 1-61     | EI324203     | IC AN6342N                  | 1-129    | ER330625  | FILTER LP LCB-62               |
| 1-62     | EI326044     | IC AN6350                   | 1-130    | ER705460  | R CT RGC2T 2W R100G            |
| 1-63     | EI324151     | IC AN6360                   | 1-131    | ES705533  | Δ SW SEESAW SDE3S2023          |
| 1-64     | EI324160     | IC AN6362                   | 1-132    | ES705534  | Δ SW TKR-22293                 |
| 1-65     | EI324182     | IC AN6371                   | 1-133    | ES318284  | SW LEVER SCL101R23A 1-01-02N   |
| 1-66     | EI322309     | IC HA11703                  | 1-134    | ES319124  | SW LEVER SCL101S 1-01-02N      |
| 1-67     | EI324107     | IC HA11718                  | 1-135    | ES319156  | SW MICRO SS-1-E-4 UC           |
| 1-68     | EI325992     | IC HD14024BP                | 1-136    | ES319334  | SW SLIDE HSW0273-220 1-02-02   |
| 1-69     | EI328593     | IC HD14053BP                | 1-137    | ES319352  | SW SLIDE HSW0372-030 2-02-03   |
| 1-70     | EI326159     | IC LM2903P                  | 1-138    | ES326043  | SW SLIDE SSS322001 2-02-02N    |

When ordering parts, please quote Parts Number, Description and Model Number.

| REF. NO. | PARTS NO. | DESCRIPTION             |
|----------|-----------|-------------------------|
| 1-139    | ES315362  | SW TACT AKC8S           |
| 1-140    | ET330533  | POSISTER PTH61G04BD3R3N |
| 1-141    | ET330535  | TR FET 2SK246 Y,GR      |
| 1-142    | ET318308  | TR PHOTO PN202S         |
| 1-143    | ET318308  | TR PHOTO PN202S         |
| 1-144    | ET325501  | TR 2SA1015 O,Y          |
| 1-145    | ET200479  | TR 2SA1115 D,E,F        |
| 1-146    | ET633677  | TR 2SA490 O,Y           |
| 1-147    | ET322778  | TR 2SA608K-NP E,F,G     |
| 1-148    | ET554657  | TR 2SA733A P,Q          |
| 1-149    | ET554657  | TR 2SA733A P,Q          |
| 1-150    | ET200925  | TR 2SA970 GR            |
| 1-151    | ET207145  | TR 2SB560 D,E,F         |
| 1-152    | ET330543  | TR 2SB621NC Q,R,S       |
| 1-153    | ET330430  | TR 2SB632K D,E,F        |
| 1-154    | ET322598  | TR 2SB632K E,F          |
| 1-155    | ET200415  | TR 2SB641 Q,R,S         |
| 1-156    | ET330216  | TR 2SB642 Q,R,S         |
| 1-157    | ET330885  | TR 2SB857 C,D           |
| 1-158    | ET301154  | TR 2SC1162 C,D          |
| 1-159    | ET522270  | TR 2SC1210 D            |
| 1-160    | ET517263  | TR 2SC1312R G,H         |
| 1-161    | ET325899  | TR 2SC1983 R            |
| 1-162    | ET322412  | TR 2SC2001 K,L,M        |
| 1-163    | ET310833  | TR 2SC2274K E           |
| 1-164    | ET200480  | TR 2SC2603 D,E,F        |
| 1-165    | ET705480  | TR 2SC2717              |
| 1-166    | ET309334  | TR 2SC458 C,D           |
| 1-167    | ET342707  | TR 2SC536NP E,F         |
| 1-168    | ET621235  | TR 2SC536NP E,F,G       |
| 1-169    | ET356962  | TR 2SC640 C             |
| 1-170    | ET328553  | TR 2SC945A K,P          |
| 1-171    | ET639437  | TR 2SC945L Q,P          |
| 1-172    | ET398711  | TR 2SC945L Q,R          |
| 1-173    | ET318604  | TR 2SD545NP E,F         |
| 1-174    | ET200741  | TR 2SD571 K,L,M         |
| 1-175    | ET330542  | TR 2SD592NC R,S         |
| 1-176    | ET310148  | TR 2SD612K E,F          |
| 1-177    | ET200412  | TR 2SD636 Q,R,S         |
| 1-178    | ET303895  | TR 2SD667 C,D           |
| 1-179    | ET303895  | TR 2SD667 C,D           |
| 1-180    | EV319159  | VR ROTARY 16P10x1D B104 |
| 1-181    | EV705536  | VR TM8KV-2S B501        |
| 1-182    | HE325273  | HEAD E HV113201 V       |
| 1-183    | HR325263  | HEAD COMBO HV225315     |
| 1-184    | MB326474  | BELT CAPSTAN            |
| 1-185    | MB322303  | BELT DETECTION          |
| 1-186    | MB780029  | BELT LOADING            |
| 1-187    | MIB328611 | FLYWHEEL PART           |
| 1-188    | MI327773  | IDLER ASSY              |
| 1-189    | MI326478  | ROLLER IMPEDANCE        |
| 1-190    | VTB319445 | LOADING LEADER (L) PART |
| 1-191    | VTB319446 | LOADING LEADER (R) PART |
| 1-192    | VT318087  | V BLOCK (L)             |
| 1-193    | VT318088  | V BLOCK (R)             |
| 1-194    | VT317947  | VERTICAL POLE PART (P)  |

## 2. HEAD DRUM BLOCK

| REF. NO.                      | PARTS NO.    | DESCRIPTION         |
|-------------------------------|--------------|---------------------|
| <b>ROLLER IMPEDANCE BLOCK</b> |              |                     |
| 2-1                           | MI326478     | ROLLER IMPEDANCE    |
| 2-2                           | VTB327708    | LEVER RZ PART       |
| 2-3                           | VTB327729    | LEVER LZ PART       |
| 2-4                           | ZW356657     | RING E 150SUP CMT   |
| 2-5                           | ZW259334     | PW2.05x035x025PSL   |
| <b>AC. H BLOCK</b>            |              |                     |
| 2-6                           | BHV1004A260A | AC. H BLK VS-SEG    |
| 2-7                           | HR325263     | HEAD COMBO HV225315 |
| 2-8                           | ZG330641     | SP PUSH ACH         |
| 2-9                           | ZG332459     | SP PUSH ACH (2)     |
| 2-10                          | ZS421806     | PAN30x08STL CMT     |
| 2-11                          | HZ327755     | GUIDE ACH           |
| 2-12                          | ZG327757     | SP PULL ACH SET     |

## DRUM BASE BLOCK

|      |           |                     |
|------|-----------|---------------------|
| 2-13 | BVB327700 | CHASSIS DRUM PART   |
| 2-14 | VT318087  | V BLOCK (L)         |
| 2-15 | ZS321298  | BID30x08STL CMT     |
| 2-16 | VT318088  | V BLOCK (R)         |
| 2-17 | ZS305246  | ADJUST SCREW (B)    |
| 2-18 | ZG330868  | SP PUSH TRACKING    |
| 2-19 | ZW306464  | PW31x070x050STL CMT |
| 2-20 | ZG331178  | SP PUSH PRESS ACH   |
| 2-21 | ZW550642  | PW31x080x050STL CMT |
| 2-22 | ZW516993  | N30STL CMT 1        |
| 2-23 | ZW357164  | RING E230SUP CMT    |
| 2-24 | ZG327736  | SP TORSION RZ       |
| 2-25 | ZG327740  | SP TORSION LZ       |
| 2-26 | ZW340648  | RING CS190STL PKR   |

## UPPER DRUM BLOCK

|      |              |                       |
|------|--------------|-----------------------|
| 2-27 | BHV1004A280A | UPPER DRUM BLK VS-SEG |
|------|--------------|-----------------------|

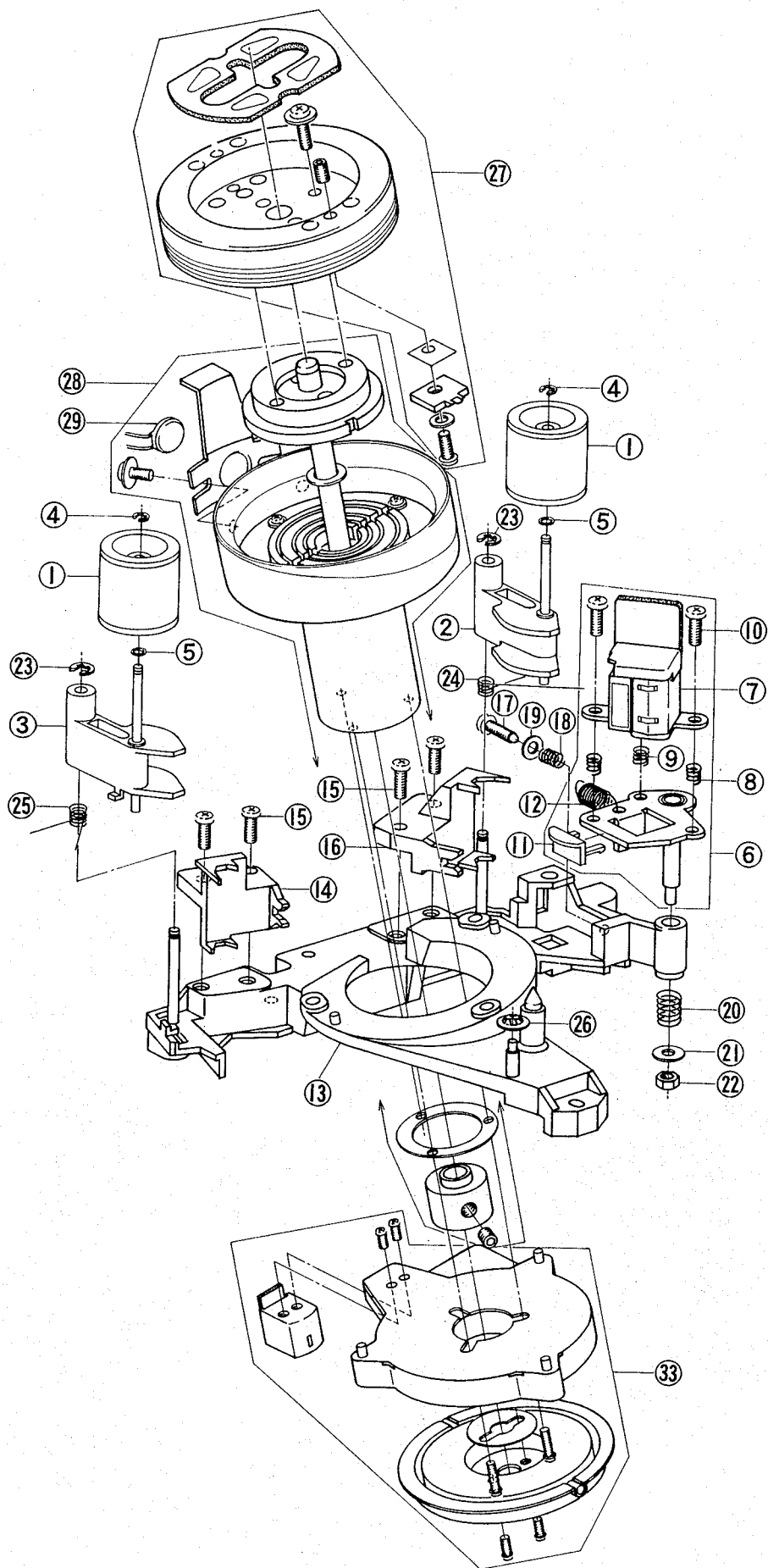
## LOWER DRUM BLOCK

|      |              |                             |
|------|--------------|-----------------------------|
| 2-28 | BVV1004A300A | LOWER DRUM BLK VS-SEG       |
| 2-29 | ET324474     | POSISTER PTH499D09BF200N030 |

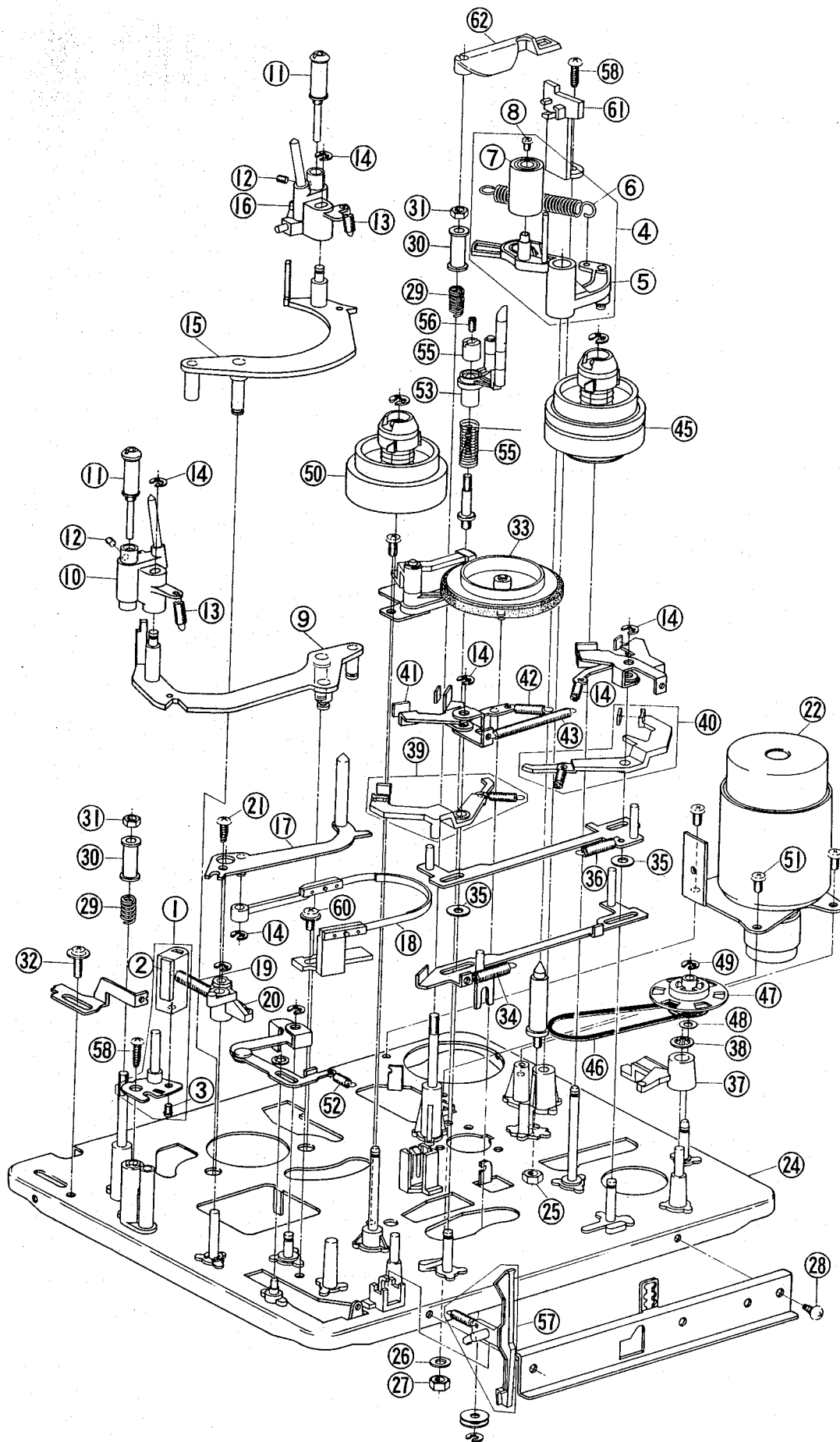
## HEAD DRUM BLOCK

|       |          |                       |
|-------|----------|-----------------------|
| 2-30x | ZS421806 | PAN30x08STL CMT       |
| 2-31x | ZW328150 | PW30x060x013PSL       |
| 2-32x | ZS609491 | PAN30x10STL CMT PW080 |
| 2-33  | BM324475 | MOTOR DDV5-1C         |

# HEAD DRUM BLOCK



# MECHA FRAME BLOCK (1)



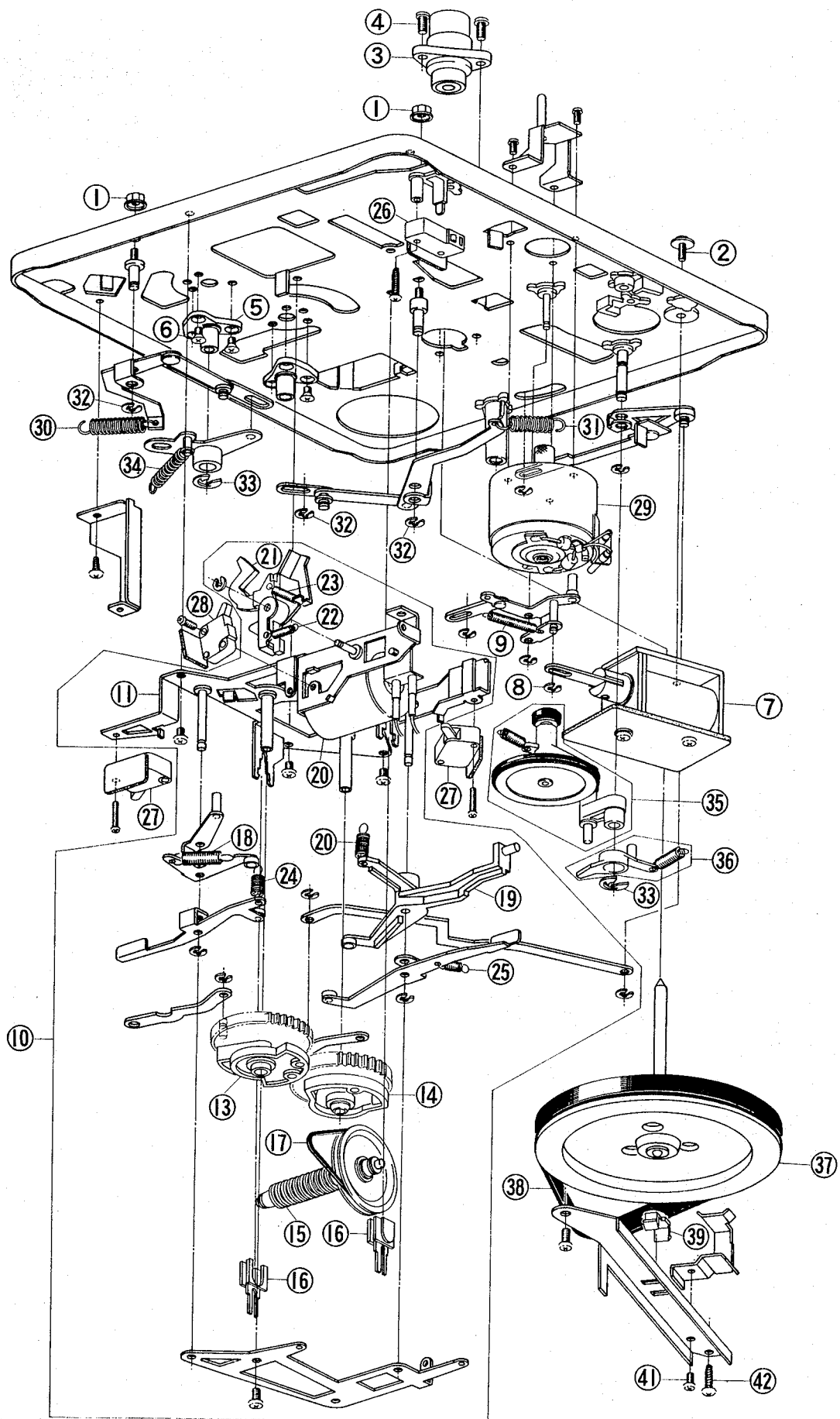


### 3. MECHA FRAME BLOCK (1)

| REF. NO.                        | PARTS NO.    | DESCRIPTION                   | REF. NO. | PARTS NO. | DESCRIPTION           |
|---------------------------------|--------------|-------------------------------|----------|-----------|-----------------------|
| <b>HOLDER ERASE HEAD BLOCK</b>  |              |                               |          |           |                       |
| 3-1                             | BVV1004A070A | HOLDER EH BLK VS-SEG          | 3-60     | ZS200614  | TRIPLE SCREW PAN30x06 |
| 3-2                             | HE325273     | HEAD E HV113201 V             | 3-61     | VT326471  | HOLDER OPENER         |
| 3-3                             | ZS477876     | PAN20x03STL CMT               | 3-62     | VT326477  | GUIDE CAP             |
| <b>LEVER PINCH ROLLER BLOCK</b> |              |                               |          |           |                       |
| 3-4                             | BVV1004A150A | LEVER PINCH ROLLER BLK VS-SEG |          |           |                       |
| 3-5                             | MLB326296    | LEVER PINCH ROLLER PART       |          |           |                       |
| 3-6                             | ZG330058     | SP T2-6.3/0.8-45 T2-202       |          |           |                       |
| 3-7                             | BVV1004A160A | ROLLER PINCH BLK VS-SEG       |          |           |                       |
| 3-8                             | ZS477876     | PAN20x03STL CMT               |          |           |                       |
| <b>LEVER LOADING (L) BLOCK</b>  |              |                               |          |           |                       |
| 3-9                             | VTB326329    | LEVER LOADING (L) PART        |          |           |                       |
| 3-10                            | VTB319445    | LOADING LEADER (L) PART       |          |           |                       |
| 3-11                            | VT317947     | VERTICAL POLE PART (P)        |          |           |                       |
| 3-12                            | ZS318212     | 6SET23x030SCM PKR WP          |          |           |                       |
| 3-13                            | ZG318043     | LEADER SPRING                 |          |           |                       |
| 3-14                            | ZW357164     | RING E230SUP CMT              |          |           |                       |
| <b>LEVER LOADING (R) BLOCK</b>  |              |                               |          |           |                       |
| 3-15                            | BVB326347    | LEVER LOADING (R) PART        |          |           |                       |
| 3-16                            | VTB319446    | LOADING LEADER (R) PART       |          |           |                       |
| <b>TENSION ARM BLOCK</b>        |              |                               |          |           |                       |
| 3-17                            | VTB326468    | LEVER TENSION PART            |          |           |                       |
| 3-18                            | VT328134     | TENSION BAND ASSY             |          |           |                       |
| 3-19                            | ZG331128     | SP T2-4.0/0.4-45 T2-120       |          |           |                       |
| 3-20                            | VT326470     | HOLDER TENSION LEVER          |          |           |                       |
| 3-21                            | ZS310984     | PT BR30x08STL CMT             |          |           |                       |
| <b>CAPSTAN MOTOR BLOCK</b>      |              |                               |          |           |                       |
| 3-22                            | BM325491     | MOTOR FG DMF-4907A            |          |           |                       |
| 3-23x                           | ZS558101     | PAN30x06STL CMT TW            |          |           |                       |
| <b>MECHA FRAME BLOCK</b>        |              |                               |          |           |                       |
| 3-24                            | BVV1004A015A | MECHA FRAME BLK VS-SEG        |          |           |                       |
| 3-25                            | ZW609434     | N FRANGE 30STL CMT            |          |           |                       |
| 3-26                            | ZW306464     | PW31x070x050STL CMT           |          |           |                       |
| 3-27                            | ZW516993     | N30STL CMT 1                  |          |           |                       |
| 3-28                            | ZS325495     | T2BR30x06STL CMT              |          |           |                       |
| 3-29                            | ZG328225     | SP C-3.5/0.8-10.0G C-102G     |          |           |                       |
| 3-30                            | MH321724     | GUIDE TAPE                    |          |           |                       |
| 3-31                            | ZW516993     | N30STL CMT 1                  |          |           |                       |
| 3-32                            | ZS328607     | TRIPLE SCREW PAN30x05         |          |           |                       |
| 3-33                            | MI327773     | IDLER ASSY                    |          |           |                       |
| 3-34                            | ZG313001     | SP T1-4.0/0.4-22.4 T1-114     |          |           |                       |
| 3-35                            | ZW259503     | PW31x080x050NYL               |          |           |                       |
| 3-36                            | ZG332463     | SP T2-3.2/0.29-20 T2-064      |          |           |                       |
| 3-37                            | ML330640     | LEVER BRAKE RELEASER          |          |           |                       |
| 3-38                            | ZW653163     | RING CS280STL PKR             |          |           |                       |
| 3-39                            | MLV1004A090A | LEVER FF BRAKE BLK VS-SEG     |          |           |                       |
| 3-40                            | MLV1004A100A | LEVER REW BRAKE BLK VS-SEG    |          |           |                       |
| 3-41                            | VT322159     | SHEET BRAKE (A)               |          |           |                       |
| 3-42                            | ZG318204     | SP T2-3.2/0.29-16 T2-062      |          |           |                       |
| 3-43                            | ZG312955     | SP T1-3.2/0.29-40.0 T1-070    |          |           |                       |
| 3-44                            | ZG318228     | SP T2-3.2/0.29-14 T2-061      |          |           |                       |
| 3-45                            | BR327789     | TU REEL TABLE ASSY            |          |           |                       |
| 3-46                            | MB322303     | BELT DETECTION                |          |           |                       |
| 3-47                            | MI322304     | WHEEL DETECTION               |          |           |                       |
| 3-48                            | ZW324417     | PW31x060x050PSL               |          |           |                       |
| 3-49                            | ZW357164     | RING E230SUP CMT              |          |           |                       |
| 3-50                            | BR317908     | SUPPLY REEL TABLE BLK         |          |           |                       |
| 3-51                            | ZS325495     | T2BR30x06STL CMT              |          |           |                       |
| 3-52                            | ZG318228     | SP T2-3.2/0.29-14 T2-061      |          |           |                       |
| 3-53                            | BVB326220    | LEVER REVIEW PART             |          |           |                       |
| 3-54                            | ZG326247     | SP TORSION REVIEW             |          |           |                       |
| 3-55                            | ZS326246     | NUT ADJUST                    |          |           |                       |
| 3-56                            | ZS328608     | 6SET26x030SCM PKR FP          |          |           |                       |
| 3-57                            | BVV1004A170A | LEVER REC SAFETY BLK VS-SEG   |          |           |                       |
| 3-58                            | ZS323993     | PT BR30x10STL CMT             |          |           |                       |
| 3-59x                           | ZW269954     | PW31x070x025PSL               |          |           |                       |

When ordering parts, please quote Parts Number, Description and Model Number.

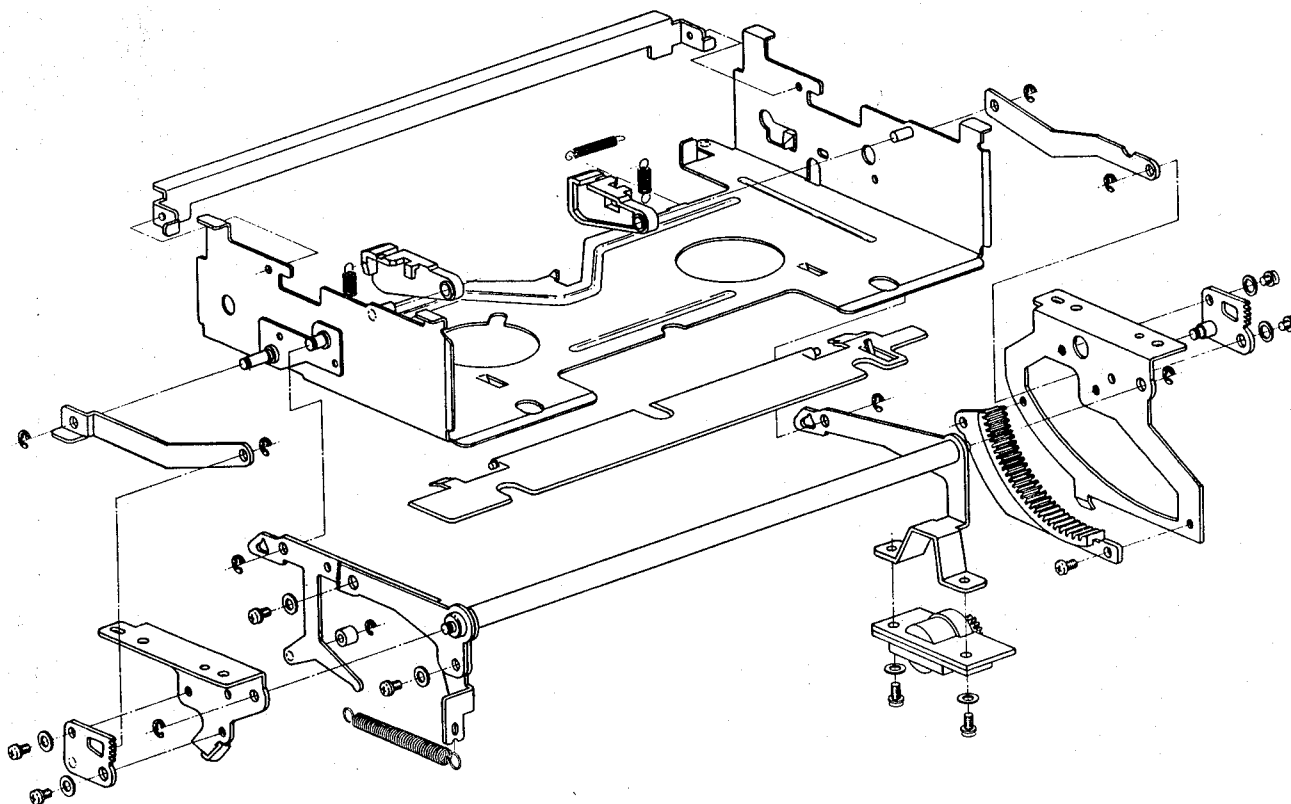
# MECHA FRAME BLOCK (2)



#### 4. MECHA FRAME BLOCK (2)

| REF. NO.             | PARTS NO.    | DESCRIPTION                                  |
|----------------------|--------------|----------------------------------------------|
| 4-1                  | ZW609434     | N FRANGE 30STL CMT                           |
| 4-2                  | ZS328607     | TRIPLE SCREW PAN30x05                        |
| 4-3                  | MZB321701    | HOLDER CAPSTAN PART                          |
| 4-4                  | ZS379350     | PAN30x06STL CMT                              |
| 4-5                  | MV322302     | METAL LOADING                                |
| 4-6                  | ZS444330     | CTS30x04STL CMT                              |
| <b>PLUNGER BLOCK</b> |              |                                              |
| 4-7                  | EP319333     | SOLENOID W/TAP 1037PLT 15V                   |
| 4-8                  | ZW357164     | RING E230SUP CMT                             |
| 4-9                  | ZG328661     | SP T2-3.2/0.29-25 T2-066                     |
| <b>LOADING BLOCK</b> |              |                                              |
| 4-10                 | BVV1004A230A | LOADING BLK VS-5EG                           |
| 4-11                 | BM780041     | LOADING MOTOR SUB ASSY                       |
| 4-12                 | BM325617     | MOTOR MXN-12AD08B                            |
| 4-13                 | VT780025     | LOADING GEAR A ASSY                          |
| 4-14                 | VT780026     | LOADING GEAR B SUB ASSY                      |
| 4-15                 | VT780027     | LOADING WARM ASSY                            |
| 4-16                 | VT780028     | HOLDER GEAR SHAFT                            |
| 4-17                 | MB780029     | BELT LOADING                                 |
| 4-18                 | ZG780032     | SP TENSION LEVER RETURN                      |
| 4-19                 | BL780033     | BRAKE LEVER ASSY                             |
| 4-20                 | ZG780035     | SP BRAKE LEVER                               |
| 4-21                 | ML780036     | LOCK ARM (A)                                 |
| 4-22                 | ZG780037     | SP LOCK RETURN                               |
| 4-23                 | ZG780038     | SP LOCK HOLD                                 |
| 4-24                 | ZG780039     | SP SW A                                      |
| 4-25                 | ZG780040     | SP SW B                                      |
| 4-26                 | ES319156     | SW MICRO SS-1-E-4 UC (SW904)                 |
| 4-27                 | ES318284     | SW LEVER SCL101R23A 1-01-02N<br>(SW905, 906) |
| 4-28                 | ES319124     | SW LEVER SCL101S 1-01-02N<br>(SW907)         |
| 4-29                 | BM325314     | MOTOR VY220B10                               |
| 4-30                 | ZG328610     | SP T2-6.3/0.8-28 T2-198                      |
| 4-31                 | ZG313085     | SP T1-6.3/0.8-25.0 T1-197                    |
| 4-32                 | ZW270101     | RING E300SUP CMT                             |
| 4-33                 | ZW290283     | RING U 285SUP CMT                            |
| 4-34                 | ZG321769     | SP T2-5.0/0.55-35.5 T2-161                   |
| 4-35                 | BV327815     | TU IDLER ASSY                                |
| 4-36                 | BVV1004A220A | LEVER TU IDLER KICK BLK<br>VS-5EG            |
| 4-37                 | MIB328611    | FLYWHEEL PART                                |
| 4-38                 | MB326474     | BELT CAPSTAN                                 |
| 4-39                 | VT326476     | HOLDER PIVOT                                 |
| 4-40x                | ZW259738     | PW41x070x025PSL                              |
| 4-41                 | ZS379350     | PAN30x06STL CMT                              |
| 4-42                 | ZS323993     | PT BR30x10STL CMT                            |

## EJECTER BLOCK



### 5. EJECTER BLOCK

| REF.<br>NO. | PARTS NO. | DESCRIPTION  |
|-------------|-----------|--------------|
| 5-1         | BV327845  | EJECTER ASSY |

## 6. VIDEO P.C BOARD BLOCK

| REF. NO.   | PARTS NO.    | DESCRIPTION                             |
|------------|--------------|-----------------------------------------|
| 6-1        | BAV1004A460A | PC VIDEO (PAL) BLK VS-5EG               |
| 6-2        | BAV1004A460B | PC VIDEO (PAL) BLK VS-5EK               |
| 6-IC1      | EI324204     | IC AN6310                               |
| 6-IC2      | EI321076     | IC AN6320N                              |
| 6-IC3      | EI324107     | IC HA11718                              |
| 6-IC4      | EI322309     | IC HA11703                              |
| 6-IC5      | EI330393     | IC MC1458P                              |
| 6-IC6      | EI324117     | IC MC14069UBCP                          |
| 6-IC7      | EI324151     | IC AN6360                               |
| 6-IC8      | EI324160     | IC AN6362                               |
| 6-IC9      | EI324182     | IC AN6371                               |
| 6-IC10     | EI324203     | IC AN6342N                              |
| 6-IC11     | EI203040     | IC $\mu$ A741CP                         |
| 6-TR1to3   | ET621235     | TR 2SC536NP E,F,G                       |
| 6-TR4      | ET200480     | TR 2SC2603 D,E,F                        |
| 6-TR5      | ET621235     | TR 2SC536NP E,F,G                       |
| 6-TR6      | ET322778     | TR 2SA608K-NP E,F,G                     |
| 6-TR7      | ET621235     | TR 2SC536NP E,F,G                       |
| 6-TR8      | ET330543     | TR 2SB621NC Q,R,S                       |
| 6-TR9      | ET200480     | TR 2SC2603 D,E,F                        |
| 6-TR10to12 | ET621235     | TR 2SC536NP E,F,G                       |
| 6-TR13to16 | ET200480     | TR 2SC2603 D,E,F                        |
| 6-TR17     | ET621235     | TR 2SC536NP E,F,G                       |
| 6-TR18     | ET200479     | TR 2SA1115 D,E,F                        |
| 6-TR19to24 | ET621235     | TR 2SC536NP E,F,G                       |
| 6-TR25     | ET310833     | TR 2SC2274K E                           |
| 6-TR26to29 | ET621235     | TR 2SC536NP E,F,G                       |
| 6-TR30to37 | ET621235     | TR 2SC536NP E,F,G                       |
| 6-TR38     | ET342707     | TR 2SC536NP E,F                         |
| 6-TR39,40  | ET621235     | TR 2SC536NP E,F,G (EG)                  |
| 6-TR41     | ET322778     | TR 2SA608K-NP E,F,G                     |
| 6-TR42     | ET621235     | TR 2SC536NP E,F,G                       |
| 6-TR43     | ET322778     | TR 2SA608K-NP E,F,G                     |
| 6-TR44     | ET621235     | TR 2SC536NP E,F,G                       |
| 6-TR46     | ET330543     | TR 2SB621NC Q,R,S                       |
| 6-TR47to50 | ET621235     | TR 2SC536NP E,F,G                       |
| 6-D1,2     | ED523427     | D SILICON H 1S16                        |
| 6-D3       | ED200469     | D SILICON H DS448 FA5 F10               |
| 6-D5to9    | ED200469     | D SILICON H DS448 FA5 F10               |
| 6-D10,11   | ED309437     | D SILICON H 1S1926-M                    |
| 6-D14to16  | ED200469     | D SILICON H DS448 FA5 F10               |
| 6-D17      | ED316143     | D SILICON H 1S2473HS F10                |
| 6-D18      | ED200469     | D SILICON H DS448 FA5 F10               |
| 6-D19      | ED200469     | D SILICON H DS448 FA5 F10(FG)           |
| 6-D20,21   | ED200469     | D SILICON H DS448 FA5 F10               |
| 6-D22to24  | ED200469     | D SILICON H DS448 FA5 F10(EG)           |
| 6-D25to28  | ED200469     | D SILICON H DS448 FA5 F10               |
| 6-D31to33  | ED200469     | D SILICON H DS448 FA5 F10               |
| 6-D34      | ED200468     | D SILICON V DS448 VB3                   |
| 6-D35      | ED560913     | D SILICON V 1S2473VE                    |
| 6-VC1      | EC257354     | C S-FIX H ECV-1ZW20x44 2.5-20           |
| 6-VC2,3    | EC318315     | C S-FIX H ECV-1ZW50x44 5.0-50           |
| 6-VC21     | EC325060     | C S-FIX V ECV-1ZW10x40                  |
| 6-VC22     | EC318375     | C S-FIX H ECV-1ZW10x44 2.0-10           |
| 6-FR1      | ER200595     | $\Delta$ R FUSE ERD2FC F10 1/4W<br>5R6J |
| 6-VR1,2    | EV315540     | R S-FIX H D8 3P 502                     |
| 6-VR3,4    | EV330365     | R S-FIX V H1052A 3P 0.15W 472           |
| 6-VR5      | EV330366     | R S-FIX V H1052A 3P 0.15W 102           |
| 6-VR6,7    | EV361800     | R S-FIX H SR19R 3P 0.15W 471            |
| 6-VR8      | EV323885     | R S-FIX H D8 3P 301                     |
| 6-VR9      | EV315753     | R S-FIX H D8 3P 203                     |
| 6-VR21     | EV330366     | R S-FIX V H1052A 3P 0.15W 102           |
| 6-VR22     | EV322411     | R S-FIX H D8 3P 202                     |
| 6-VR23     | EV319381     | R S-FIX H D8 3P 501                     |
| 6-VR24     | EV316442     | R S-FIX H D8 3P 102                     |
| 6-VR25     | EV315540     | R S-FIX H D8 3P 502                     |
| 6-VL21,22  | EO322349     | COIL VARI 1 T-4-A 8.2 $\mu$ H           |
| 6-VL23     | EO325093     | COIL VARI 1 T-6 8.2MH (EG)              |
| 6-L1       | EO318381     | COIL FIX 1 LAL04 220 $\mu$ H K          |
| 6-L2       | EO330240     | COIL FIX 1 EL0606SKI 47 $\mu$ H K       |
| 6-L3       | EO330241     | COIL FIX 1 EL0606SKI 220 $\mu$ H K      |
| 6-L4       | EO330242     | COIL FIX 1 EL0606SKI 39 $\mu$ H K       |
| 6-L5,6     | EO330241     | COIL FIX 1 EL0606SKI 220 $\mu$ H K      |
| 6-L7,8     | EO330244     | COIL FIX 1 EL0606SKI 2.2 $\mu$ H K      |

| REF. NO. | PARTS NO. | DESCRIPTION                        |
|----------|-----------|------------------------------------|
| 6-L9     | EO330245  | COIL FIX 1 EL0606SKI 10 $\mu$ H K  |
| 6-L10    | EO330246  | COIL FIX 1 EL0606SKI 56 $\mu$ H K  |
| 6-L11    | EO330247  | COIL FIX 1 EL0606SKI 27 $\mu$ H K  |
| 6-L12    | EO330250  | COIL FIX 1 EL0606SKI 22 $\mu$ H K  |
| 6-L13    | EO330248  | COIL FIX 1 EL0606SKI 33 $\mu$ H K  |
| 6-L14    | EO330241  | COIL FIX 1 EL0606SKI 220 $\mu$ H K |
| 6-L15    | EO318381  | COIL FIX 1 LAL04 220 $\mu$ H K     |
| 6-L17    | EO330248  | COIL FIX 1 EL0606SKI 33 $\mu$ H K  |
| 6-L18,19 | EO330249  | COIL FIX 1 EL0606SKI 8.2 $\mu$ H K |
| 6-L21    | EO330241  | COIL FIX 1 EL0606SKI 220 $\mu$ H K |
| 6-L22    | EO318381  | COIL FIX 1 LAL04 220 $\mu$ H K     |
| 6-L23    | EO330250  | COIL FIX 1 EL0606SKI 22 $\mu$ H K  |
| 6-L24    | EO318381  | COIL FIX 1 LAL04 220 $\mu$ H K     |
| 6-L25,26 | EO330241  | COIL FIX 1 EL0606SKI 220 $\mu$ H K |
| 6-L27    | EO330251  | COIL FIX 1 EL0606SKI 470 $\mu$ H K |
| 6-L28    | EO322315  | COIL FIX 1 EL0810SKI 820 $\mu$ H J |
| 6-L29    | EO318381  | COIL FIX 1 LAL04 220 $\mu$ H K     |
| 6-L30    | EO318383  | COIL FIX 1 FL07H 6.8MH J           |
| 6-L31    | EO330240  | COIL FIX 1 EL0606SKI 47 $\mu$ H K  |
| 6-L32    | EO330248  | COIL FIX 1 EL0606SKI 33 $\mu$ H K  |
| 6-L33    | EO318381  | COIL FIX 1 LAL04 220 $\mu$ H K     |
| 6-L35    | EO379923  | COIL FIX 1 FL07H 8.2MH (EG)        |
| 6-L36,37 | EO318381  | COIL FIX 1 LAL04 220 $\mu$ H K     |
| 6-L38    | EO330252  | COIL FIX 1 EL0606SKI 100 $\mu$ H K |
| 6-L39    | EO330246  | COIL FIX 1 EL0606SKI 56 $\mu$ H K  |
| 6-L40    | EO330241  | COIL FIX 1 EL0606SKI 220 $\mu$ H K |
| 6-L41    | EO330240  | COIL FIX 1 EL0606SKI 47 $\mu$ H K  |
| 6-L42    | EO322315  | COIL FIX 1 LAL04 120 $\mu$ H J     |
| 6-FL1    | ER324258  | FILTER LC LP LCB-51                |
| 6-FL2    | ER324259  | FILTER LC LP LCB-52                |
| 6-FL3    | ER324305  | FILTER LC HP LCB-53                |
| 6-FL4    | ER324309  | FILTER LC LP LCB-54                |
| 6-FL5    | ER330625  | FILTER LP LCB-62                   |
| 6-FL6    | ER324339  | FILTER LC AP LCB-56                |
| 6-FL7    | ER324375  | FILTER LC BP LCB-57 4.43MHZ        |
| 6-FL8    | ER324398  | FILTER LC LP LCB-58                |
| 6-FL9    | ER324469  | FILTER LC LP LCB-59                |
| 6-FL10   | ER324470  | FILTER LC BP LCB-60 4.43MHZ        |
| 6-FL11   | ER325807  | FILTER LC BP LCB-61 5.06MHZ        |
| 6-FL12   | ER328237  | FILTER CE SFE4.5MB 4.5MHZ          |
| 6-X1     | EI327364  | OSC X'TAL HC-33/U 4.435571MHZ      |
| 6-X2     | EI309878  | OSC X'TAL 4.433619MHZ              |
| 6-DL1    | EI322365  | DL EFD-EN645A11E                   |
| 6-DL2    | EI322394  | DL EFD-JN124A11A                   |
| 6-C3     | EC307793  | C EC V F05 NP SM 220M 10DC         |
| 6-C16    | EC332052  | C EC V F05 NP SM 4R7M 35DC         |
| 6-C171   | EC200949  | C EC V F05 NP SM 470M 10DC         |
| 6-3      | TP326491  | HINGE PC ROD                       |

## 7. SERVO P.C BOARD BLOCK

| REF. NO.                     | PARTS NO.    | DESCRIPTION                                                     |
|------------------------------|--------------|-----------------------------------------------------------------|
| 7-1                          | BAV1004A450A | PC SERVO BLK VS-5EG<br>(INCLUDING SERVO PCB &<br>SYS. CON. PCB) |
| <b>SERVO P.C BOARD BLOCK</b> |              |                                                                 |
| 7-IC1                        | EI326044     | IC AN6350                                                       |
| 7-IC2                        | EI304475     | IC MC14066BCP                                                   |
| 7-IC3                        | EI313797     | IC TC4001BP                                                     |
| 7-IC4                        | EI321604     | IC AN6341N                                                      |
| 7-IC5                        | EI330393     | IC MC1458P                                                      |
| 7-IC6                        | EI304475     | IC MC14066BCP                                                   |
| 7-IC7                        | EI325992     | IC HD14024BP                                                    |
| 7-IC8                        | EI328593     | IC HD14053BP                                                    |
| 7-TR1,2                      | ET309334     | TR 2SC458 C,D                                                   |
| 7-TR3                        | ET322778     | TR 2SA608K-NP E,F,G                                             |
| 7-TR4,5                      | ET309334     | TR 2SC458 C,D                                                   |
| 7-TR6,7                      | ET322778     | TR 2SA608K-NP E,F,G                                             |
| 7-TR8to11                    | ET309334     | TR 2SC458 C,D                                                   |
| 7-TR12,13                    | ET322778     | TR 2SA608K-NP E,F,G                                             |
| 7-TR14                       | ET309334     | TR 2SC458 C,D                                                   |
| 7-TR15                       | ET322778     | TR 2SA608K-NP E,F,G                                             |
| 7-TR16                       | ET309334     | TR 2SC458 C,D                                                   |
| 7-TR17                       | ET322778     | TR 2SA608K-NP E,F,G                                             |
| 7-TR18                       | ET309334     | TR 2SC458 C,D                                                   |
| 7-D1                         | ED200469     | D SILICON H DS448 FA5 F10                                       |
| 7-D2to13                     | ED557447     | D SILICON H 1S1588                                              |
| 7-D14,15                     | ED200469     | D SILICON H DS448 FA5 F10                                       |
| 7-D16to19                    | ED557447     | D SILICON H 1S1588                                              |
| 7-D20,21                     | ED200469     | D SILICON H DS448 FA5 F10                                       |
| 7-SW1                        | ES326043     | SW SLIDE SSS322001 2-02-02N                                     |
| 7-VR1                        | EV325993     | R S-FIX V H1052A 3P 0.15W 473                                   |
| 7-VR2                        | EV323880     | R S-FIX V CR29R 3P 0.50W 683                                    |
| 7-VR3to5                     | EV323881     | R S-FIX V CR29R 3P 0.50W 473                                    |
| 7-VR6                        | EV323880     | R S-FIX V CR29R 3P 0.50W 683                                    |
| 7-VR7                        | EV323881     | R S-FIX V CR29R 3P 0.50W 473                                    |
| 7-VR8                        | EV330258     | R S-FIX V H1052A 3P 0.15W 683                                   |
| 7-VR9,10                     | EV325994     | R S-FIX V H1052A 3P 0.15W 103                                   |
| 7-VR11                       | EV325995     | R S-FIX V H1052A 3P 0.15W 333                                   |
| 7-VR12                       | EV200466     | R S-FIX H EVN38 3P 302                                          |
| 7-L1                         | EO357287     | COIL FIX 1 FL05H 100μH K                                        |
| 7-R7,8                       | ER330272     | R MF H F10 1/4W 3302F                                           |
| 7-R13                        | ER318335     | R MF H F10 1/4W 8202F                                           |
| 7-R17                        | ER317658     | R MF H F10 1/4W 1003F                                           |
| 7-R18                        | ER314630     | R MF H 1/4W 1003F                                               |
| 7-R19                        | ER311773     | R MF H 1/4W 3301F                                               |
| 7-R20                        | ER323374     | R MF H F10 1/4W 1302F                                           |
| 7-R22                        | ER330273     | R MF H F10 1/4W 1693F                                           |
| 7-R23                        | ER330274     | R MF H F10 1/4W 2003F                                           |
| 7-R24                        | ER318323     | R MF H F10 1/4W 1803F                                           |
| 7-R25                        | ER314597     | R MF H 1/4W 1302F                                               |
| 7-R28                        | ER311773     | R MF H 1/4W 3301F                                               |

### SYS. CON. P.C BOARD BLOCK

|              |          |                             |
|--------------|----------|-----------------------------|
| 7-IC301      | EI323995 | IC MB8841 502J              |
| 7-IC302,303  | EI319496 | IC MC14539BCP               |
| 7-IC304      | EI326159 | IC LM2903P                  |
| 7-IC305      | EI330392 | IC MC14070BCP               |
| 7-IC306      | EI324687 | IC TC4071BP                 |
| 7-IC307      | EI324000 | IC MB8841 463M              |
| 7-IC308      | EI328692 | IC μPD5101LC                |
| 7-IC309      | EI328690 | IC AM1408N8                 |
| 7-IC310      | EI324255 | IC TL082CP                  |
| 7-IC311      | EI304475 | IC MC14066BCP               |
| 7-IC312      | EI330393 | IC MC1458P                  |
| 7-IC313      | EI326159 | IC LM2903P                  |
| 7-IC314,315  | EI304657 | IC TC4011BP                 |
| 7-TR301      | ET207145 | Δ TR 2SB560 D,E,F           |
| 7-TR302,303  | ET322778 | Δ TR 2SA608K-NP E,F,G       |
| 7-TR304,305  | ET309334 | TR 2SC458 C,D               |
| 7-TR306      | ET207145 | Δ TR 2SB560 D,E,F           |
| 7-TR307to310 | ET322778 | TR 2SA608K-NP E,F,G         |
| 7-TR311to313 | ET309334 | TR 2SC458 C,D               |
| 7-D301       | ED323979 | D SILICON W03B F12 150/1.0A |
| 7-D302to305  | ED557447 | D SILICON H 1S1588          |
| 7-D306       | ED306109 | Δ D SILICON W03B 100/1.0A   |

| REF. NO.   | PARTS NO. | DESCRIPTION                     |
|------------|-----------|---------------------------------|
| 7-D307     | ED570521  | D ZENER H XZ-049                |
| 7-D308,309 | ED557447  | D SILICON H 1S1588              |
| 7-D310,311 | ED200468  | D SILICON V DS448 VB3           |
| 7-D312     | ED557447  | D SILICON H 1S1588              |
| 7-D313     | ED200469  | D SILICON H DS448 FA5 F10       |
| 7-D314     | ED557447  | D SILICON H 1S1588              |
| 7-D315     | ED306109  | Δ D SILICON W03B 100/1.0A       |
| 7-D316     | ED557447  | D SILICON H 1S1588              |
| 7-RL301    | EP330266  | RELAY POWER G2U-112P 1TR<br>12V |
| 7-X301     | EO330256  | OSC CE F85-006 4MHZ             |
| 7-BT301    | AX325991  | BATTERY P-2M11                  |
| 7-L301,302 | EO575651  | COIL FIX 1 FL07H-100μH K        |
| 7-CR301    | ER330314  | COMP CR EXRP101K433S            |
| 7-CR302    | ER330313  | COMP CR EXRP150K272S            |
| 7-CR303    | ER330267  | COMP R 01-0320                  |
| 7-R345     | ER323875  | R MF H F10 1/4W 3900F           |
| 7-R346     | ER317684  | R MF H F10 1/4W 9100F           |
| 7-R352     | ER311774  | R MF H 1/4W 9102F               |
| 7-R357     | ER314632  | R MF H 1/4W 3902F               |
| 7-2        | VT325900  | BUZZER PKM11-4A0                |

## 8. AUDIO P.C BOARD BLOCK

| REF. NO.  | PARTS NO.    | DESCRIPTION                  |
|-----------|--------------|------------------------------|
| 8-1       | BAV1004A040A | PC AUDIO BLK VS-5EG          |
| 8-IC1     | E1634454     | IC AN262                     |
| 8-TR1,2   | ET517263     | TR 2SC1312R G,H              |
| 8-TR3to7  | ET309334     | TR 2SC458 C,D                |
| 8-TR8     | ET322778     | TR 2SA608K-NP E,F,G          |
| 8-TR9     | ET322412     | TR 2SC2001 K,L,M             |
| 8-TR10    | ET330543     | TR 2SB621NC Q,R,S            |
| 8-TR11    | ET322778     | TR 2SA608K-NP E,F,G          |
| 8-TR12    | ET200480     | Δ TR 2SC2603 D,E,F           |
| 8-TR13    | ET309334     | TR 2SC458 C,D                |
| 8-TR14    | ET200479     | Δ TR 2SA1115 D,E,F           |
| 8-TR15,16 | ET309334     | TR 2SC458 C,D                |
| 8-D2      | ED200468     | D SILICON V DS448 VB3        |
| 8-D4to14  | ED200468     | D SILICON V DS448 VB3        |
| 8-VR1     | EV315412     | R S-FIX H D8 3P 502          |
| 8-VR2     | EV315414     | R S-FIX H D8 3P 203          |
| 8-VR3     | EV315416     | R S-FIX H D8 3P 103          |
| 8-VR4     | EV321637     | R S-FIX H D8 3P 104          |
| 8-RL1     | EP327336     | RELAY SIGNAL G2V-2 2TR 12V   |
| 8-RL2     | EP200175     | RELAY SIGNAL G2E 1TR 12V     |
| 8-L2,3    | EO357287     | COIL FIX 1 FL05H 100μH K     |
| 8-L4      | EO369178     | COIL FIX 1 FL07H 1.5MH J     |
| 8-L5      | EO318383     | COIL FIX 1 FL07H 6.8MH J     |
| 8-L6      | EO419602     | COIL FIX 1 FL05H 47μH K      |
| 8-L7      | EO243977     | COIL FIX 1 FL07H 1MH J       |
| 8-L8      | EO357287     | COIL FIX 1 FL05H 100μH K     |
| 8-L10     | EO323938     | COIL OSC 1 32-1296-12 70KHZ  |
| 8-L11     | EO318882     | COIL FIX 2 47-0079-01 950μH  |
| 8-FR1     | ER318647     | R FUSE ERD2FC F10 1/4W 4R7J  |
| 8-C36     | EC200592     | C STY V T05 CQT92 331J 125DC |
| 8-C37     | EC330441     | C PP V F10 PFH 153J 400DC    |
| 8-C50     | EC330442     | C PP V F10 PFH 123J 400DC    |
| 8-2       | ZW698940     | RV NYL40x060 BL              |

## 10. DRIVE P.C BOARD BLOCK

| REF. NO.   | PARTS NO.    | DESCRIPTION                      |
|------------|--------------|----------------------------------|
| 10-1       | BVA1004A350A | PC DRIVE BLK VS-5EG              |
| 10-TR2     | ET322598     | Δ TR 2SB632K E,F                 |
| 10-TR3     | ET200412     | TR 2SD636 Q,R,S                  |
| 10-TR4     | ET330542     | TR 2SD592NC R,S                  |
| 10-TR5     | ET310148     | TR 2SD612K E,F                   |
| 10-TR6     | ET200412     | TR 2SD636 Q,R,S                  |
| 10-TR7     | ET318308     | TR PHOTO PN202S                  |
| 10-TR13    | ET322598     | TR 2SB632K E,F                   |
| 10-TR14    | ET200412     | TR 2SD636 Q,R,S                  |
| 10-TR15    | ET322598     | TR 2SB632K E,F                   |
| 10-TR16    | ET200415     | TR 2SB641 Q,R,S                  |
| 10-TR17,18 | ET330543     | TR 2SB621NC Q,R,S                |
| 10-TR19    | ET200415     | TR 2SB641 Q,R,S                  |
| 10-TR20    | ET310148     | TR 2SD612K E,F                   |
| 10-TR21    | ET200415     | Δ TR 2SB641 Q,R,S                |
| 10-TR22    | ET200412     | TR 2SD636 Q,R,S                  |
| 10-TR23    | ET330542     | TR 2SD592NC R,S                  |
| 10-TR25    | ET309334     | TR 2SC458 C,D                    |
| 10-D1,2    | ED323979     | D SILICON W03B F12 150/1.0A      |
| 10-D3to5   | ED200469     | D SILICON H DS448 FA5 F10        |
| 10-D6      | ED570521     | D ZENER H XZ-049                 |
| 10-D7      | ED327059     | D ZENER H WZ-100                 |
| 10-D8to15  | ED200469     | D SILICON H DS448 FA5 F10        |
| 10-D16     | ED330428     | D ZENER H WZ-090                 |
| 10-D17     | ED327059     | D ZENER H WZ-100                 |
| 10-RL2,3   | EP318925     | RELAY POWER FBR221D006<br>2TR 6V |
| 10-PH1     | ED323892     | PHOTO SENSOR GP-411              |
| 10-IN1     | EL330446     | PL SPL HOLDER LAMP               |
| 10-TH1     | ET330533     | Δ POSISTER PTH61G04BD3R3N        |
| 10-R31     | ER439132     | R OMF H 2W 151K                  |
| 10-R34     | ER330408     | R OMF H 2W 121K                  |

## 9. DISPLAY P.C BOARD BLOCK

| REF. NO.  | PARTS NO.    | DESCRIPTION                |
|-----------|--------------|----------------------------|
| 9-1       | BAV1004A060A | PC DISPLAY BLK VS-5EG      |
| 9-IC1     | E1330226     | IC μPC1373H                |
| 9-IC3     | E1324250     | IC MC14050BCP              |
| 9-IC4     | E1330451     | IC MB8843 501M             |
| 9-TR2     | ET330535     | TR FET 2SK246 Y, GR        |
| 9-TR3     | ET322778     | TR 2SA608K-NP E,F,G        |
| 9-TR4     | ET309334     | TR 2SC458 C,D              |
| 9-TR5to24 | ET330216     | TR 2SB642 Q,R,S            |
| 9-TR25,26 | ET207145     | TR 2SB560 D,E,F            |
| 9-TR27    | ET200412     | TR 2SD636 Q,R,S            |
| 9-D6      | ED330238     | D PHOTO PH302              |
| 9-D7to40  | ED200469     | D SILICON H DS448 FA5 F10  |
| 9-D41to44 | ED324823     | D LED SLP-234C GRN         |
| 9-D45,46  | ED324943     | D LED SLP-134A RED         |
| 9-D47,48  | ED324823     | D LED SLP-234C GRN         |
| 9-D49     | ED324943     | D LED SLP-134A RED         |
| 9-SW1to26 | ES315362     | SW TACT AKC8S              |
| 9-IN1     | EM318923     | IND FL FIP12AM11 CHARACTER |
| 9-L1      | EO330326     | COIL VARI 1 7PA 5MH        |
| 9-L2      | EO318379     | COIL FIX 1 LAL04 100μH K   |
| 9-X1      | EO330256     | OSC CE F85-006 4MHZ        |
| 9-2       | VT327211     | SHIELD CASE REMOCON (A)    |
| 9-3       | VT327212     | FILTER                     |
| 9-4       | VT326856     | HOLDER LED (A)             |
| 9-5       | VT326870     | HOLDER LED (B)             |
| 9-6       | VT326873     | CAP LED                    |
| 9-7       | VT326610     | HOLDER DISPLAY (A)         |
| 9-8       | VT326829     | HOLDER DISPLAY (B)         |
| 9-9       | VT326787     | HOLDER PHOTO DIODE         |
| 9-10      | ZW698940     | RV NYL40x060 BL            |

## 11. DRUM P.C BOARD BLOCK

| REF. NO.                      | PARTS NO.    | DESCRIPTION                                                                  |
|-------------------------------|--------------|------------------------------------------------------------------------------|
| 11-1                          | BAV1004A530A | PC DRUM MOTOR BLK VS-5EG<br>(INCLUDING DRM MOTOR PCB<br>& CAPSTAN MOTOR PCB) |
| DRUM MOTOR P.C BOARD BLOCK    |              |                                                                              |
| 11-IC101                      | E1330431     | IC TA7234                                                                    |
| 11-TR101                      | ET330430     | Δ TR 2SB632K D,E,F                                                           |
| 11-TR102                      | ET200412     | TR 2SD636 Q,R,S                                                              |
| 11-TR103                      | ET200415     | TR 2SB641 Q,R,S                                                              |
| 11-TR104                      | ET200412     | TR 2SD636 Q,R,S                                                              |
| 11-TH101                      | ET330533     | Δ POSISTER PTH61G04BD3R3N                                                    |
| 11-R102                       | ER330537     | R OMF H SNP 2W 102J                                                          |
| 11-R103                       | ER330540     | R MF H SNP 2W 2R2J                                                           |
| 11-R115                       | ER330538     | R OMF H SNP 2W 331J                                                          |
| 11-R116,117                   | ER330539     | R OMF H SNP 2W 221J                                                          |
| CAPSTAN MOTOR P.C BOARD BLOCK |              |                                                                              |
| 11-TR1,2                      | ET200415     | TR 2SB641 Q,R,S                                                              |
| 11-TR3,4                      | ET200412     | TR 2SD636 Q,R,S                                                              |
| 11-TR5                        | ET200741     | TR 2SD571 K,L,M                                                              |
| 11-TR6                        | ET325899     | Δ TR 2SC1983 R                                                               |
| 11-TR7                        | ET330885     | Δ TR 2SB857 C,D                                                              |
| 11-D1,2                       | ED200469     | D SILICON H DS448 FA5 F10                                                    |
| 11-D3                         | ED327059     | D ZENER H WZ-100                                                             |
| 11-VR1                        | EV330453     | R S-FIX V H1052A 3P 0.15W 223                                                |
| 11-RL1                        | EP318925     | RELAY POWER FBR221D006<br>2TR 6V                                             |

When ordering parts, please quote Parts Number, Description and Model Number.

## 12. TUNER P.C BOARD BLOCK

| REF. NO.  | PARTS NO. | DESCRIPTION                    |
|-----------|-----------|--------------------------------|
| 12-1      | BA705538  | PC TUNER BLK VS-5 (EG)         |
| 12-2      | BA705539  | PC TUNER BLK VS-5 (EK)         |
| 12-3      | EE330292  | TV TUNER CDE1-011 (EG)         |
| 12-4      | EE330106  | TV TUNER CBE1-002 (EK)         |
| 12-IC1    | EI705494  | IC TA7607P                     |
| 12-IC2    | EI704201  | IC M5144P                      |
| 12-TR1    | ET705480  | TR 2SC2717                     |
| 12-TR2to4 | ET356962  | TR 2SC640 C                    |
| 12-TR5    | ET522270  | TR 2SC1210 D                   |
| 12-TR6to8 | ET639437  | TR 2SC945L Q,P (EG)            |
| 12-TR9,10 | ET325501  | TR 2SA1015 O,Y (EG)            |
| 12-TR11   | ET639437  | TR 2SC945L Q,P                 |
| 12-TR12   | ET325501  | TR 2SA1015 O,Y (EG)            |
| 12-TR13   | ET639437  | TR 2SC945L Q,P (EG)            |
| 12-TR14   | ET639437  | TR 2SC945L Q,P                 |
| 12-TR15   | ET325501  | TR 2SA1015 O,Y                 |
| 12-TR16   | ET639437  | TR 2SC945L Q,P                 |
| 12-D1     | ED705479  | D SILICON 1SV70                |
| 12-D2     | ED604541  | D SILICON 1S2076               |
| 12-D3to5  | ED604541  | D SILICON 1S2076 (EG)          |
| 12-D7     | ED604541  | D SILICON 1S2076 (EG)          |
| 12-D8     | ED604541  | D SILICON 1S2076               |
| 12-D9,10  | ED604541  | D SILICON 1S2076 (EG)          |
| 12-D11,12 | ED604541  | D SILICON 1S2076               |
| 12-L1     | EO705481  | COIL FIX 1 144LZ 1μH K         |
| 12-L2     | EO705482  | COIL FIX 1 144LZ 0.82μH K (EG) |
| 12-L2     | EO705481  | COIL FIX 1 144LZ 1μH K (EK)    |
| 12-L3     | EO705483  | COIL FIX 1 1.4μH               |
| 12-L4     | EO705484  | COIL FIX 1 4.7μH K             |
| 12-L5     | EO705485  | COIL FIX 1 33μH K              |
| 12-L6     | EO701411  | COIL RF SPL 15μH               |
| 12-L7     | EO705487  | COIL FIX 1 100μH K             |
| 12-L8     | EO701411  | COIL RF SPL 15μH               |
| 12-L9     | EO705488  | COIL FIX 1 12μH K (EG)         |
| 12-L9     | EO705489  | COIL FIX 1 10μH K (EK)         |
| 12-T2     | EO705490  | COIL TKXNAAS-27899RY           |
| 12-T3     | EO705491  | COIL TKXNS-279789NK            |
| 12-T4     | EO705492  | COIL TKACS-27617NK (EG)        |
| 12-T4     | EO705493  | COIL TKACS-27618NK (EK)        |
| 12-CF101  | ER705495  | FILTER CE F1024 38.9MHZ (EG)   |
| 12-CF101  | ER705496  | FILTER CE F1025 39.5MHZ (EK)   |
| 12-CF102  | ER705499  | FILTER CE SFE 5.5MHZ (EG)      |
| 12-CF102  | ER705500  | FILTER CE SFE 6MHZ (EK)        |
| 12-CF103  | ER705501  | FILTER CE TPS 5.5MHZ (EG)      |
| 12-CF103  | ER705502  | FILTER CE TPS 6MHZ (EK)        |
| 12-VR1    | EV572433  | R S-FIX H V8K4-1 3P 504        |
| 12-VR2,3  | EV464196  | R S-FIX H V8K4-1 3P 202        |
| 12-VR4    | EV464207  | R S-FIX H V8K4-1 3P 502        |
| 12-VR5    | EV464207  | R S-FIX H V8K4-1 3P 502 (EG)   |
| 12-R20    | ER702565  | Δ R FUSE 1/4 470J              |
| 12-C8     | EC305423  | C TT V D R47M 35DC             |
| 12-C12    | EC705473  | C CE LH680J 50DC               |
| 12-C14    | EC705474  | C CE CH2R0C 50DC               |
| 12-C25    | EC705476  | C CE RH8R0D 50DC (EG)          |
| 12-C25    | EC705477  | C CE RH6R0D 50DC (EK)          |
| 12-C31    | EC705478  | C CE CH620J 50DC               |
| 12-C40    | EC705474  | C CE CH2R0C 50DC               |
| 12-C41    | EC200481  | C CE V F05 CH 360J 50DC        |
| 12-C42    | EC200494  | C CE V F05 100J 50DC           |

## 13. POWER SUPPLY P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION                                                      |
|----------|-----------|------------------------------------------------------------------|
| 13-1     | BA705542  | PC POWER BLK (INCLUDING POWER SUPPLY PCB, POWER SUB PCB, TR PCB) |

### POWER SUPPLY P.C BOARD BLOCK

|           |          |                          |
|-----------|----------|--------------------------|
| 13-IC1    | EI301748 | Δ IC μPC1458C            |
| 13-IC2    | EI308473 | Δ IC μPC141C             |
| 13-TR5    | ET554657 | Δ TR 2SA733A P,Q         |
| 13-TR8    | ET200479 | TR 2SA1115 D,E,F         |
| 13-TR11   | ET301154 | Δ TR 2SC1162 C,D         |
| 13-TR12   | ET554657 | TR 2SA733A P,Q           |
| 13-TR13   | ET200925 | Δ TR 2SA970 GR           |
| 13-TR14   | ET200925 | Δ TR 2SA970 GR           |
| 13-TR15   | ET303895 | TR 2SD667 C,D            |
| 13-TR16   | ET398711 | Δ TR 2SC945L Q,R         |
| 13-D1     | ED705467 | Δ D SILICON M4B51-14     |
| 13-D2     | ED705468 | Δ D SILICON T1B4B41      |
| 13-D6     | ED705469 | Δ D ZENER HZ6C-2         |
| 13-D8     | ED705468 | D SILICON T1B4B41        |
| 13-D11    | ED329058 | Δ D ZENER H HZ5 C1       |
| 13-D14    | ED704267 | Δ D SILICON 10E-1        |
| 13-D15    | ED704267 | Δ D SILICON 10E-1        |
| 13-D16    | ED704267 | D SILICON 10E-1          |
| 13-D17    | ED704267 | D SILICON 10E-1          |
| 13-D18    | ED705470 | Δ D ZENER HZ11C1         |
| 13-D24    | ED704267 | D SILICON 10E-1          |
| 13-T1     | BT705472 | Δ TRANS POWER KX590176   |
| 13-F2     | EF564491 | Δ FUSE T 4AT CEE         |
| 13-F3     | EF375647 | Δ FUSE T 500MAT CEE      |
| 13-F4     | EF354295 | Δ FUSE T 1.6AT CEE       |
| 13-VR1    | EV705536 | VR TM8KV-2S B501         |
| 13-R10    | ER705459 | Δ R FUSE FMR W 1/4W 100J |
| 13-R12    | ER705460 | R CT RGC2T 2W R100G      |
| 13-R13    | ER310326 | R MF H 1/4W 1002F        |
| 13-R14    | ER314599 | R MF H 1/4W 1501F        |
| 13-R25    | ER310436 | R MF H 1/4W 3901F        |
| 13-R44    | ER302353 | R MF H F10 1/4W 2701F    |
| 13-C1     | EC705462 | C CE 222M 50DC           |
| 13-C2     | EC705461 | C EC 153M 25DC           |
| 13-C9,10  | EC705463 | C EC 101M 100DC          |
| 13-C18    | EC705465 | C EC 472 35DC            |
| 13-C30,31 | EC705466 | C EC 4R7 100DC           |

### POWER SUB P.C BOARD BLOCK

|           |          |                  |
|-----------|----------|------------------|
| 13-TR1    | ET633677 | TR 2SA490 O,Y    |
| 13-TR2    | ET303895 | TR 2SD667 C,D    |
| 13-TR3    | ET200479 | TR 2SA1115 D,E,F |
| 13-D3     | ED704267 | D SILICON 10E-1  |
| 13-D4     | ED704267 | D SILICON 10E-1  |
| 13-D5     | ED704267 | D SILICON 10E-1  |
| 13-D21,22 | ED704267 | D SILICON 10E-1  |
| 13-F1     | EF375660 | Δ FUSE T 1AT CEE |
| 13-F5     | EF375660 | Δ FUSE T 1AT CEE |

### TR P.C BOARD BLOCK

|        |          |                 |
|--------|----------|-----------------|
| 13-TR6 | ET633677 | Δ TR 2SA490 O,Y |
|--------|----------|-----------------|



#### 14. REAR P.C BOARD BLOCK

| REF. NO. | PARTS NO.    | DESCRIPTION                  |
|----------|--------------|------------------------------|
| 14-1     | BAV1004A020A | PC REAR BLK VS-5EG           |
| 14-J901  | EJ319158     | JACK PLATE VS-5 B0002        |
| 14-SW901 | ES319334     | SW SLIDE HSW0273-220 1-02-02 |
| 14-SW902 | ES319352     | SW SLIDE HSW0372-030 2-02-03 |
| 14-2     | ZW263946     | RV NYL40x050                 |

#### 19. REMOTE CONTROL (RC-V5) BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION           |
|----------|-----------|-----------------------|
| 19-1     | AX328710  | REMOCON UNIT RC-V5    |
| 19-IC1   | EI780020  | IC $\mu$ PD1986C      |
| 19-TR1   | ET328553  | TR 2SC945A K,P        |
| 19-TR2   | ET318604  | TR 2SD545NP E,F       |
| 19-D1,2  | ED706226  | D LED SE303A INFRARED |
| 19-D3    | ED780019  | D LED SEL1123W        |
| 19-X1    | EI780021  | OSC CE                |
| 19-SW1   | ES780015  | SW SLIDE              |

#### 15. MEMORY P.C BOARD BLOCK

| REF. NO.                      | PARTS NO. | DESCRIPTION                   |
|-------------------------------|-----------|-------------------------------|
| <b>MIC P.C BOARD BLOCK</b>    |           |                               |
| 15-J902                       | EJ330544  | PHONE J 3P HLJ0315-010 6.3 2T |
| 15-VR901                      | EV319159  | VR ROTARY 16P10x1D B104       |
| <b>MEMORY P.C BOARD BLOCK</b> |           |                               |
| 15-SW903                      | ES328771  | SW PUSH SPI222N 2-02-02N      |

#### 16. SENSOR P.C BOARD BLOCK

| REF. NO.                                | PARTS NO. | DESCRIPTION                  |
|-----------------------------------------|-----------|------------------------------|
| <b>SENSOR P.C BOARD BLOCK</b>           |           |                              |
| 16-TR1                                  | ET318308  | TR PHOTO PN202S              |
| <b>REC SAFETY SW P.C BOARD BLOCK</b>    |           |                              |
| 16-SW904                                | ES319156  | SW MICRO SS-1-E-4 UC         |
| <b>LOADING SW (A,B) P.C BOARD BLOCK</b> |           |                              |
| 16-SW905,906                            | ES318284  | SW LEVER SCL101R23A 1-01-02N |
| <b>EJECT P.C BOARD BLOCK</b>            |           |                              |
| 16-SW907                                | ES319124  | SW LEVER SCL101S 1-01-02N    |

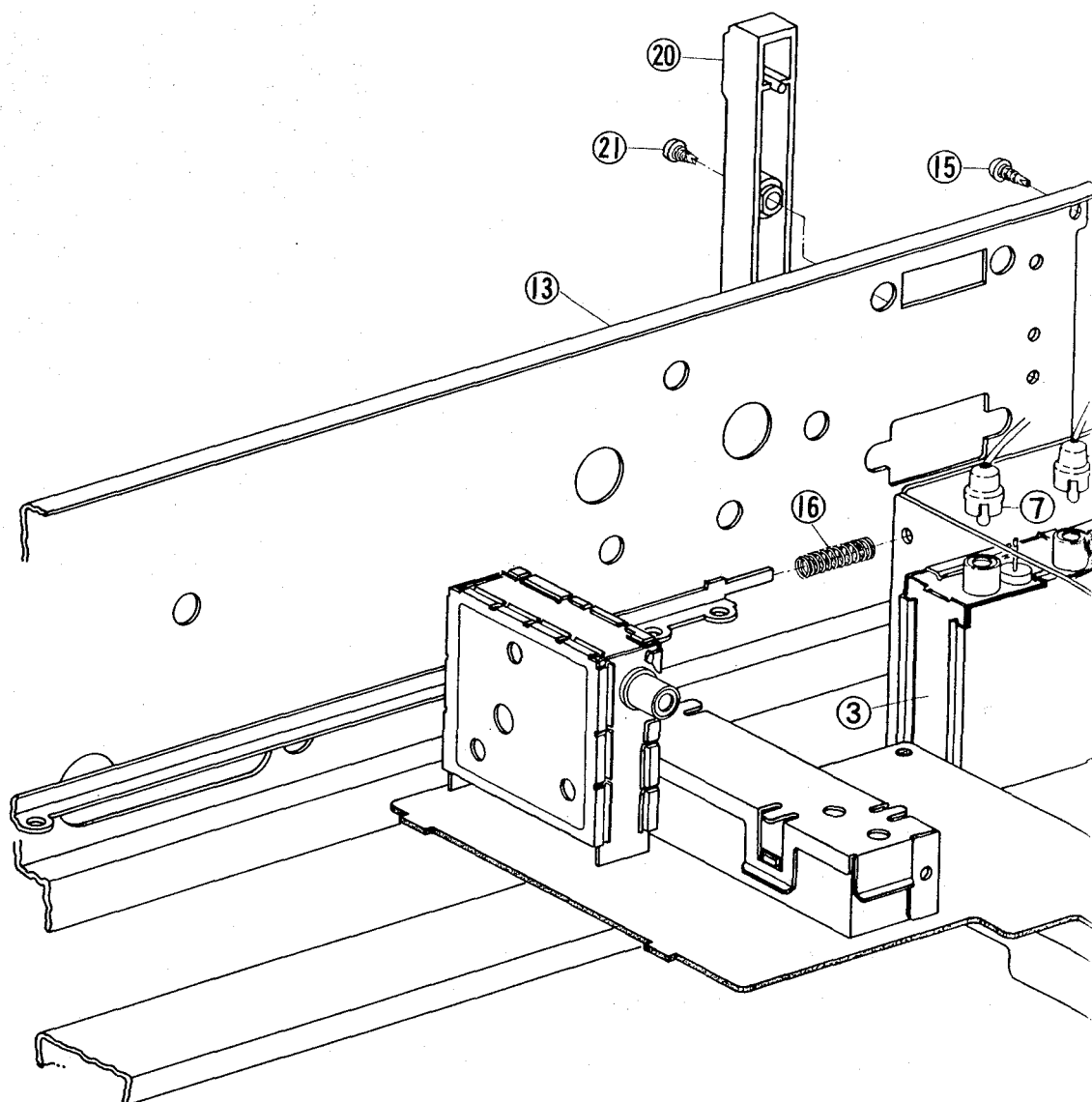
#### 17. CM FILTER P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION                   |
|----------|-----------|-------------------------------|
| 17-L1    | EO669273  | COIL FIX 2 FL5R200 18 $\mu$ H |
| 17-FL1,2 | ER330465  | FILTER LC DST310-55B271M      |
| 17-C1    | EC330466  | C EC V F05 NP SM 4R7M 50DC    |

#### 18. MOTOR FILTER P.C BOARD BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION                   |
|----------|-----------|-------------------------------|
| 18-L1to4 | EO405630  | COIL FIX 1 FL05H 82 $\mu$ H K |

## POWER & RF BLOCK

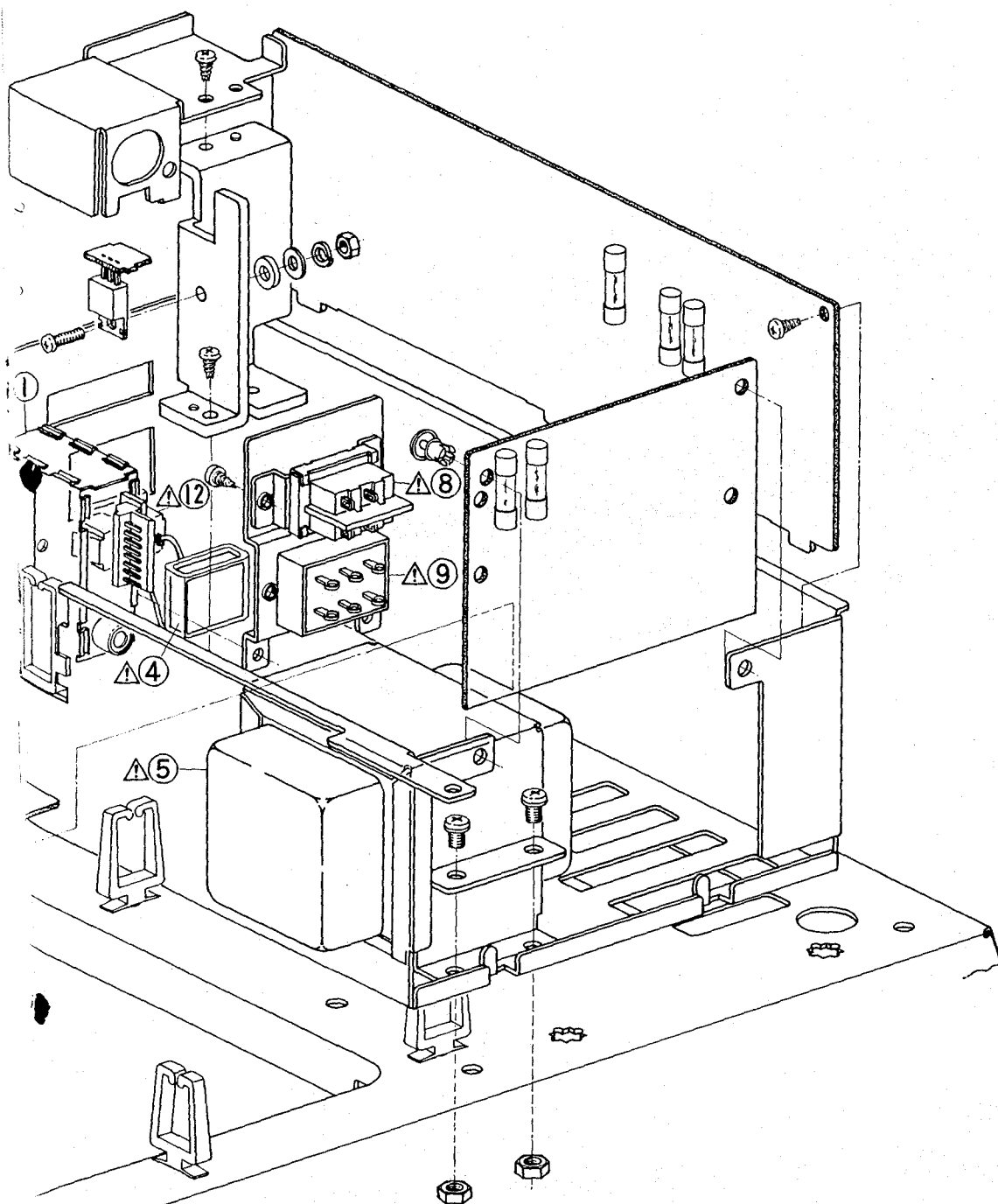


## 20. POWER & RF BLOCK

| REF. NO. | PARTS NO. | DESCRIPTION                |
|----------|-----------|----------------------------|
| 20-1     | BV330109  | RF CONVERTER MDK3-253 (EG) |
| 20-2x    | BV330110  | RF CONVERTER MBK3-253 (EK) |
| 20-3     | BV330111  | ANT BOOSTER YBC1-001       |
| 20-4     | EC325485  | Δ C MP V 473M 250AC        |
| 20-5     | BT705526  | Δ TRANS POWER VS-5-1B (EG) |
| 20-6x    | BT705527  | Δ TRANS POWER VS-5-3B (EK) |

| REF. NO. | PARTS NO. | DESCRIPTION                         |
|----------|-----------|-------------------------------------|
| 20-7     | EW705529  | COAXIAL CABLE 1.5C 2V<br>KC243462A1 |
| 20-8     | ES705533  | Δ SW SEESAW SDE3S2023               |
| 20-9     | ES705534  | Δ SW TKR-22293                      |
| 20-10x   | EF375660  | Δ FUSE T 1AT CEE                    |
| 20-11x   | EJ592503  | FUSE CLIP H0426-A 5.2MM             |

When ordering parts, please quote Parts Number, Description and Model Number.

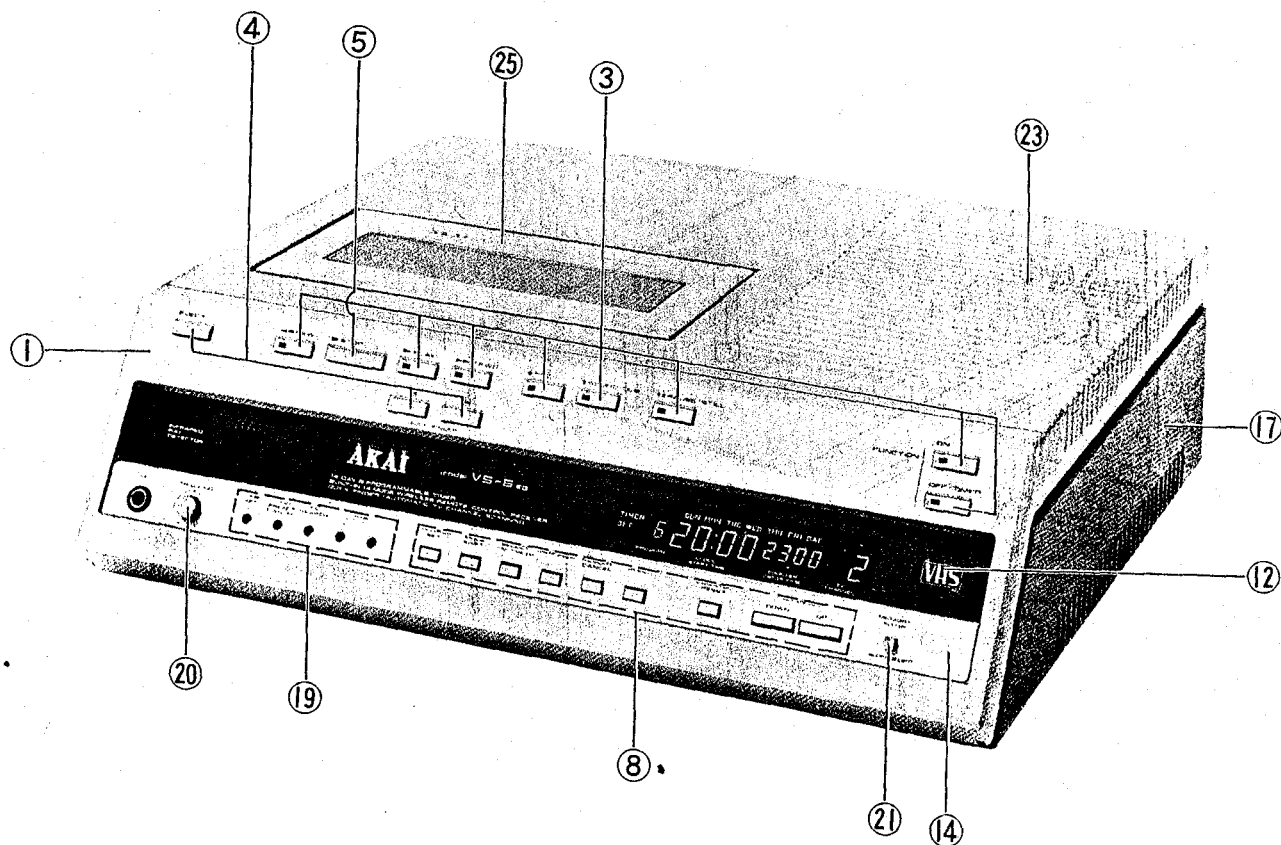


| REF. NO. | PARTS NO. | DESCRIPTION                 |
|----------|-----------|-----------------------------|
| 20-12    | EJ301513  | △ SOCKET INLET S-16453 E 2P |
| 20-13    | SP328220A | PANEL REAR VS-5EG           |
| 20-14x   | SP328220B | PANEL REAR VS-5EK           |
| 20-15    | ZS447761  | T2BR30x06STL BNI            |

| REF. NO. | PARTS NO. | DESCRIPTION               |
|----------|-----------|---------------------------|
| 20-16    | ZG313193  | SP C-4.5/0.6-20.0-0 C-040 |
| 20-17x   | VT327946  | HOLE PLUG 417             |
| 20-18x   | ZS330841  | -FFL20x1.8STL NI3         |
| 20-19x   | MZ327113  | SHIELD CASE PRE AMP (A)   |
| 20-20    | SA327691  | FOOT VERTICAL             |
| 20-21    | ZS463353  | T2BR30x08STL BNI          |

When ordering parts, please quote Parts Number, Description and Model Number.

## FINAL ASSEMBLY BLOCK



## 21. FINAL ASSEMBLY BLOCK

REF. NO. PARTS NO. DESCRIPTION

### FRONT PANEL BLOCK

|        |              |                              |
|--------|--------------|------------------------------|
| 21-1   | BDV1004A430A | PANEL FRONT BLK VS-5EG       |
| 21-2x  | BDV1004A430B | PANEL FRONT BLK VS-5EK       |
| 21-3   | SK327694     | KNOB OPERATION               |
| 21-4   | SK327685     | KNOB OPERATION SUB           |
| 21-5   | SK327684     | KNOB STOP                    |
| 21-6x  | MZ327509     | HOLDER CASE                  |
| 21-7x  | ZS310984     | PT BR30x08STL CMT            |
| 21-8   | SK327676     | KNOB FUNCTION                |
| 21-9x  | ZG332009     | PT BR30x06STL CMT            |
| 21-10  | SK327682     | KNOB SUB FUNCTION            |
| 21-11x | ZS310984     | PT BR30x08STL CMT            |
| 21-12  | BDB327392A   | PANEL DISPLAY VS-5EG PART    |
| 21-13x | BDB327392B   | PANEL DISPLAY VS-5EK PART    |
| 21-14  | SP327469A    | PANEL FUNCTION (A) (ENGLISH) |
| 21-15x | VT327847     | TRAN LEG T-H                 |
| 21-16x | ZS523664     | T2BR30x10STL CMT             |
| 21-17  | SP327692     | CASE SIDE (R)                |

REF. NO. PARTS NO. DESCRIPTION

|        |          |                        |
|--------|----------|------------------------|
| 21-18x | ZS311745 | T2BR30x08STL BNI PW080 |
| 21-19x | SP327693 | CASE SIDE (L)          |
| 21-20  | SK327689 | KNOB TRACKING          |

### FINAL ASSEMBLY BLOCK

|        |           |                                           |
|--------|-----------|-------------------------------------------|
| 21-21  | SK327686  | KNOB PUSH                                 |
| 21-22x | ZW322110  | PW61x100x100NYL                           |
| 21-23  | SP327696  | CASE UPPER                                |
| 21-24x | ZS321783  | ST BID40x10STL NI3                        |
| 21-25  | BD327698A | LID CASSETTE (ENGLISH)                    |
| 21-26x | SP327697  | COVER BOTTOM                              |
| 21-27x | ZS311745  | T2BR30x08STL BNI PW080                    |
| 21-28x | EW315767  | Δ AC CORD 2 CORES<br>KP-419C/KS-15 E (EG) |
| 21-29x | EW322400  | Δ AC CORD 2 CORES<br>GTBS-2F/KS-15 B (EK) |
| 21-30x | EW321758  | CORD VY-15 ANTENNA CABLE                  |

When ordering parts, please quote Parts Number, Description and Model Number.

# INDEX

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| AX325991     | 7-BT301    | ED200469  | 6-D14to16   | EI309878  | 6-X2        | EO330249  | 6-L18,19    |
| AX328710     | 19-1       | ED200469  | 6-D18       | EI313797  | 7-IC3       | EO330250  | 6-L12       |
| BAV1004A020A | 14-1       | ED200469  | 6-D19       | EI319496  | 7-IC302,303 | EO330250  | 6-L23       |
| BAV1004A040A | 8-1        | ED200469  | 6-D20,21    | EI321076  | 6-IC2       | EO330251  | 6-L27       |
| BAV1004A060A | 9-1        | ED200469  | 6-D25to28   | EI321604  | 7-IC4       | EO330252  | 6-L38       |
| BAV1004A350A | 10-1       | ED200469  | 6-D22to24   | EI322309  | 6-IC4       | EO330256  | 7-X301      |
| BAV1004A450A | 7-1        | ED200469  | 7-D1        | EI322365  | 6-DL1       | EO330256  | 9-X1        |
| BAV1004A460A | 6-1        | ED200469  | 7-D14,15    | EI322394  | 6-DL2       | EO330326  | 9-L1        |
| BAV1004A460B | 6-2        | ED200469  | 7-D20,21    | EI323995  | 7-IC301     | EO332315  | 6-L42       |
| BAV1004A530A | 11-1       | ED200469  | 7-D313      | EI324000  | 7-IC307     | EO357287  | 7-L1        |
| BA705538     | 12-1       | ED200469  | 9-D7to40    | EI324107  | 6-IC3       | EO357287  | 8-L2,3      |
| BA705539     | 12-2       | ED200469  | 10-D3to5    | EI324117  | 6-IC6       | EO357287  | 8-L8        |
| BA705542     | 13-1       | ED200469  | 10-D8to15   | EI324151  | 6-IC7       | EO369178  | 8-L4        |
| BDB327392A   | 21-12      | ED200469  | 11-D1,2     | EI324160  | 6-IC8       | EO379923  | 6-L35       |
| BDB327392B   | 21-13x     | ED306109  | 7-D315      | EI324182  | 6-IC9       | EO405630  | 18-L1to4    |
| BDV1004A430A | 21-1       | ED306109  | 7-D306      | EI324203  | 6-IC10      | EO419602  | 8-L6        |
| BDV1004A430B | 21-2x      | ED309437  | 6-D10,11    | EI324204  | 6-IC1       | EO575651  | 7-L301,302  |
| BD327698A    | 21-25      | ED316143  | 6-D17       | EI324250  | 9-IC3       | EO669273  | 17-L1       |
| BHV1004A260A | 2-6        | ED323892  | 10-PH1      | EI324255  | 7-IC310     | EO701411  | 12-L8       |
| BHV1004A280A | 2-27       | ED323979  | 7-D301      | EI324687  | 7-IC306     | EO701411  | 12-L6       |
| BL780033     | 4-19       | ED323979  | 10-D1,2     | EI325992  | 7-IC7       | EO705481  | 12-L2       |
| BM324475     | 2-33       | ED324823  | 9-D41to44   | EI326044  | 7-IC1       | EO705481  | 12-L1       |
| BM325314     | 4-29       | ED324823  | 9-D47,48    | EI326159  | 7-IC304     | EO705482  | 12-L2       |
| BM325491     | 3-22       | ED324943  | 9-D49       | EI326159  | 7-IC313     | EO705483  | 12-L3       |
| BM325617     | 4-12       | ED324943  | 9-D45,46    | EI327364  | 6-X1        | EO705484  | 12-L4       |
| BM780041     | 4-11       | ED327059  | 10-D7       | EI328593  | 7-IC8       | EO705485  | 12-L5       |
| BR317908     | 3-50       | ED327059  | 10-D17      | EI328690  | 7-IC309     | EO705487  | 12-L7       |
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| BT705472     | 13-T1      | ED329058  | 13-D11      | EI330226  | 9-IC1       | EO705489  | 12-L9       |
| BT705526     | 20-5       | ED330238  | 9-D6        | EI330392  | 7-IC305     | EO705490  | 12-T2       |
| BT705527     | 20-6x      | ED330428  | 10-D16      | EI330393  | 6-IC5       | EO705491  | 12-T3       |
| BVB326220    | 3-53       | ED523427  | 6-D1,2      | EI330393  | 7-IC312     | EO705492  | 12-T4       |
| BVB326347    | 3-15       | ED557447  | 7-D308,309  | EI330393  | 7-IC5       | EO705493  | 12-T4       |
| BVB327700    | 2-13       | ED557447  | 7-D316      | EI330431  | 11-IC101    | EP200175  | 8-RL2       |
| BVV1004A015A | 3-24       | ED557447  | 7-D312      | EI330451  | 9-IC4       | EP318925  | 10-RL2,3    |
| BVV1004A070A | 3-1        | ED557447  | 7-D302to305 | EI634454  | 8-IC1       | EP318925  | 11-RL1      |
| BVV1004A150A | 3-4        | ED557447  | 7-D2to13    | EI704201  | 12-IC2      | EP319333  | 4-7         |
| BVV1004A160A | 3-7        | ED557447  | 7-D314      | EI705494  | 12-IC1      | EP327336  | 8-RL1       |
| BVV1004A170A | 3-57       | ED557447  | 7-D16to19   | EI780020  | 19-IC1      | EP330266  | 7-RL301     |
| BVV1004A220A | 4-36       | ED560913  | 6-D35       | EI780021  | 19-X1       | ER200595  | 6-FR1       |
| BVV1004A230A | 4-10       | ED570521  | 7-D307      | EJ301513  | 20-12       | ER302353  | 13-R44      |
| BVV1004A300A | 2-28       | ED570521  | 10-D6       | EJ319158  | 14-J901     | ER310326  | 13-R13      |
| BV327815     | 4-35       | ED604541  | 12-D8       | EJ330544  | 15-J902     | ER310436  | 13-R25      |
| BV327845     | 5-1        | ED604541  | 12-D2       | EJ592503  | 20-11x      | ER311773  | 7-R28       |
| BV330109     | 20-1       | ED604541  | 12-D3to5    | EL330446  | 10-IN1      | ER311773  | 7-R19       |
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| BV330111     | 20-3       | ED604541  | 12-D9,10    | EO243977  | 8-L7        | ER314597  | 7-R25       |
| EC200481     | 12-C41     | ED604541  | 12-D7       | EO318379  | 9-L2        | ER314599  | 13-R14      |
| EC200494     | 12-C42     | ED704267  | 13-D21,22   | EO318381  | 6-L15       | ER314630  | 7-R18       |
| EC200592     | 8-C36      | ED704267  | 13-D4       | EO318381  | 6-L22       | ER314632  | 7-R357      |
| EC200949     | 6-C171     | ED704267  | 13-D3       | EO318381  | 6-L24       | ER317658  | 7-R17       |
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| EC305423     | 12-C8      | ED704267  | 13-D17      | EO318381  | 6-L33       | ER318323  | 7-R24       |
| EC307793     | 6-C3       | ED704267  | 13-D16      | EO318381  | 6-L36,37    | ER318335  | 7-R13       |
| EC318315     | 6-VC2,3    | ED704267  | 13-D14      | EO318381  | 6-L1        | ER318647  | 8-FR1       |
| EC318375     | 6-VC22     | ED704267  | 13-D24      | EO318383  | 6-L30       | ER323374  | 7-R20       |
| EC325060     | 6-VC21     | ED704267  | 13-D15      | EO318383  | 8-L5        | ER323875  | 7-R345      |
| EC325485     | 20-4       | ED705467  | 13-D1       | EO318882  | 8-L11       | ER324258  | 6-FL1       |
| EC330441     | 8-C37      | ED705468  | 13-D8       | EO322315  | 6-L28       | ER324259  | 6-FL2       |
| EC330442     | 8-C50      | ED705468  | 13-D2       | EO322349  | 6-VL21,22   | ER324305  | 6-FL3       |
| EC330466     | 17-C1      | ED705469  | 13-D6       | EO323938  | 8-L10       | ER324309  | 6-FL4       |
| EC332052     | 6-C16      | ED705470  | 13-D18      | EO325093  | 6-VL23      | ER324339  | 6-FL6       |
| EC705461     | 13-C2      | ED705479  | 12-D1       | EO330240  | 6-L41       | ER324375  | 6-FL7       |
| EC705462     | 13-C1      | ED706226  | 19-D1,2     | EO330240  | 6-L31       | ER324398  | 6-FL8       |
| EC705463     | 13-C9,10   | ED780019  | 19-D3       | EO330240  | 6-L2        | ER324469  | 6-FL9       |
| EC705465     | 13-C18     | EE330106  | 12-4        | EO330241  | 6-L5,6      | ER324470  | 6-FL10      |
| EC705466     | 13-C30,31  | EE330292  | 12-3        | EO330241  | 6-L14       | ER325807  | 6-FL11      |
| EC705473     | 12-C12     | EF354295  | 13-F4       | EO330241  | 6-L25,26    | ER328237  | 6-FL12      |
| EC705474     | 12-C40     | EF375647  | 13-F3       | EO330241  | 6-L3        | ER330267  | 7-CR303     |
| EC705474     | 12-C14     | EF375660  | 13-F5       | EO330241  | 6-L40       | ER330272  | 7-R7,8      |
| EC705476     | 12-C25     | EF375660  | 13-F1       | EO330241  | 6-L21       | ER330273  | 7-R22       |
| EC705477     | 12-C25     | EF375660  | 20-10x      | EO330242  | 6-L4        | ER330274  | 7-R23       |
| EC705478     | 12-C31     | EF564491  | 13-F2       | EO330244  | 6-L7,8      | ER330313  | 7-CR302     |
| ED200468     | 6-D34      | EI203040  | 6-IC11      | EO330245  | 6-L9        | ER330314  | 7-CR301     |
| ED200468     | 7-D310,311 | EI301748  | 13-IC1      | EO330246  | 6-L39       | ER330408  | 10-R34      |
| ED200468     | 8-D4to14   | EI304475  | 7-IC2       | EO330246  | 6-L10       | ER330465  | 17-FL1,2    |
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| ED200469     | 6-D31to33  | EI304475  | 7-IC311     | EO330248  | 6-L13       | ER330538  | 11-R115     |
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| ER439132  | 10-R31       | ET322778  | 7-TR307to310 | EV361800     | 6-VR6,7  | ZG318043  | 3-13     |
| ER702565  | 12-R20       | ET322778  | 7-TR15       | EV464196     | 12-VR2,3 | ZG318204  | 3-42     |
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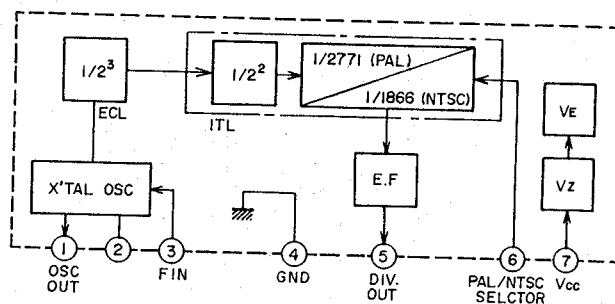
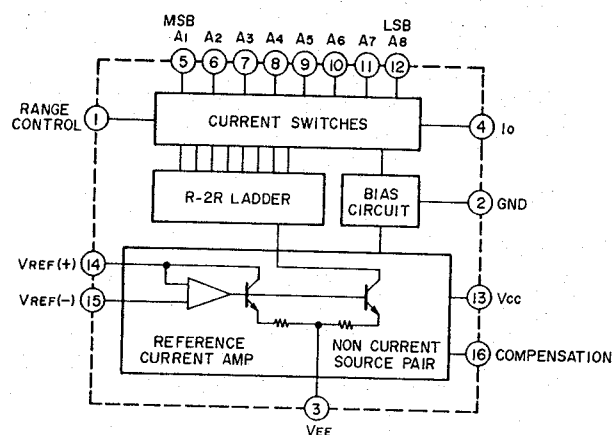
### SECTION 3

## **SCHEMATIC DIAGRAM**

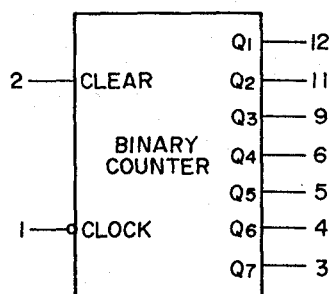
1. SCHEMATIC DIAGRAM OF ICs
2. VS-5 EG/EK NO. 12-1 1621636A CONNECTION DIAGRAM
3. VS-5 EG/EK NO. 12-2 1621637A VIDEO BLOCK DIAGRAM
4. VS-5 EG/EK NO. 12-3 1621638A VIDEO (PAL) SCHEMATIC DIAGRAM
5. VS-5 EG/EK NO. 12-4 1621639A AUDIO SCHEMATIC DIAGRAM
6. VS-5 EG/EK NO. 12-5 1621640A SYSCON SCHEMATIC DIAGRAM
7. VS-5 EG/EK NO. 12-6 1621641A SERVO SCHEMATIC DIAGRAM
8. VS-5 EG/EK, RC-V5 NO. 12-7 1621642A DISPLAY SCHEMATIC DIAGRAM
9. VS-5 EG/EK NO. 12-8 1621643A DRIVE SCHEMATIC DIAGRAM
10. VS-5 EG/EK NO. 12-9 1621644A DRUM/CAPSTAN MOTOR SCHEMATIC DIAGRAM
11. VS-5 EG/EK NO. 12-10 1621645A POWER SUPPLY SCHEMATIC DIAGRAM
12. VS-5 EG NO. 12-11 1621646A TUNER SCHEMATIC DIAGRAM
13. VS-5 EK NO. 12-12 1621647A TUNER SCHEMATIC DIAGRAM



## AN6342N



## HD14024BP

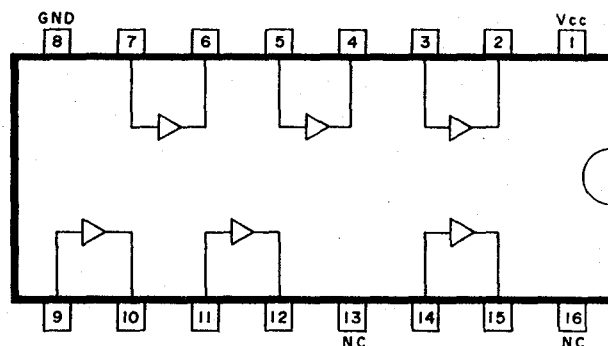


V<sub>DD</sub> : 14  
V<sub>SS</sub> : 7  
NC : 8,10,13

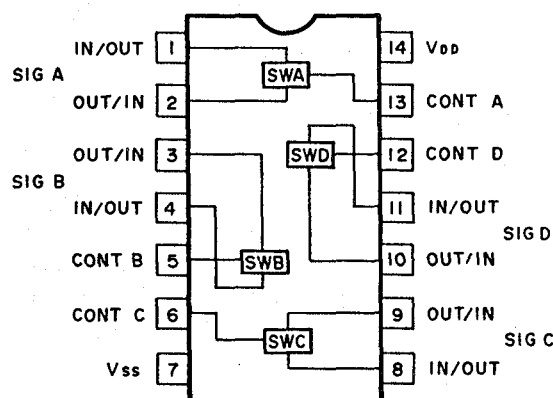
| CLOCK Δ | CLEAR | OUTPUT STATE          |
|---------|-------|-----------------------|
| *       | H     | ALL OUTPUTS="L"       |
|         | L     | NO CHANGE             |
|         | L     | ADVANCE TO NEXT STATE |

Δ: LEVEL CHANGE, \*: DON'T CARE

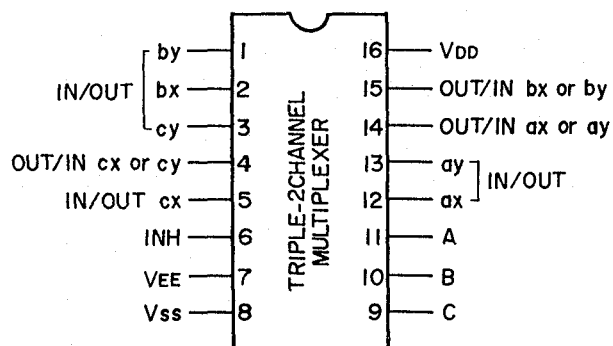
## MC14050BCP



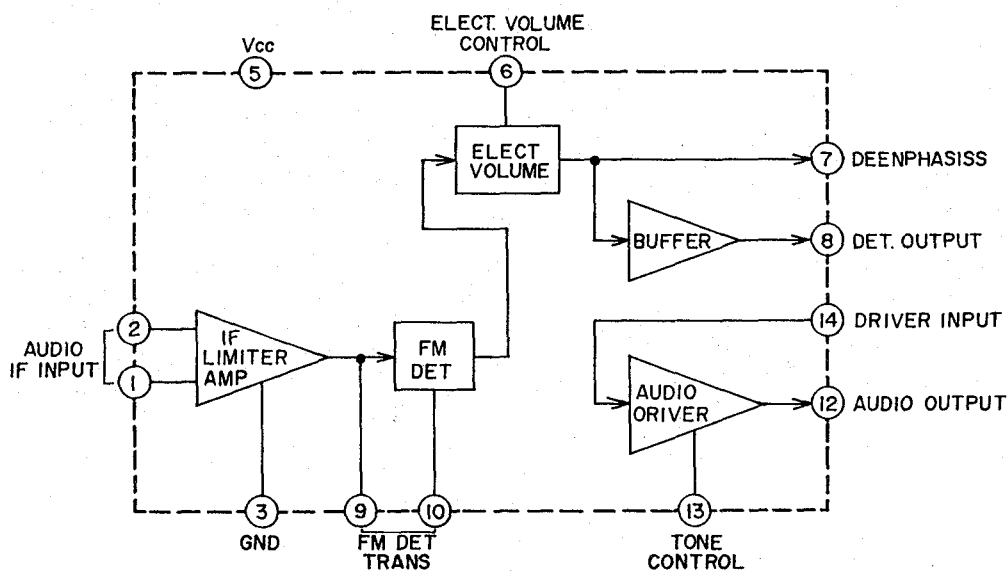
## MC14066BCP



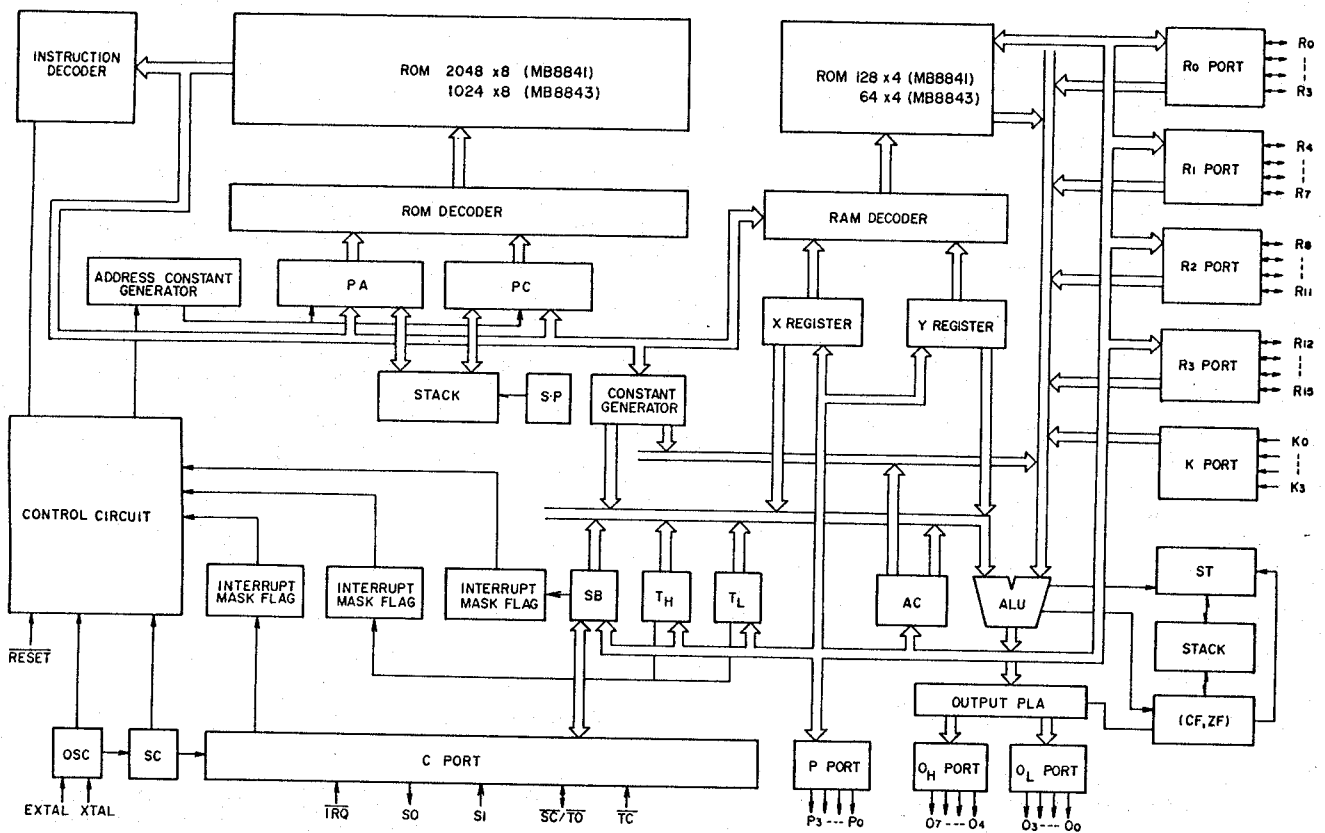
## HD14053BP



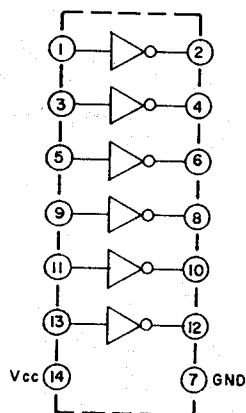
## M5144P



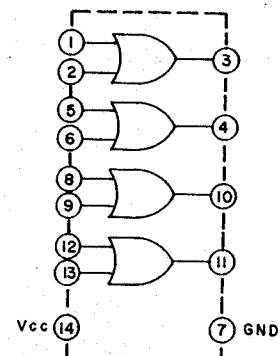
# MB8841-462J/MB8843-501M



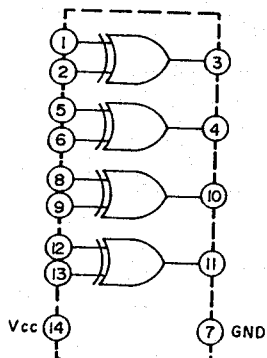
## MC14069UBCP



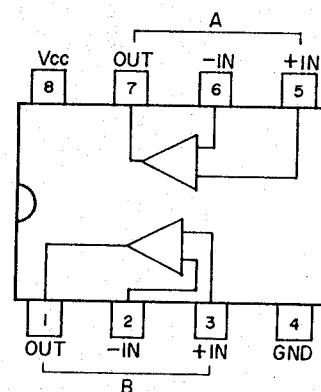
## MC14071BP



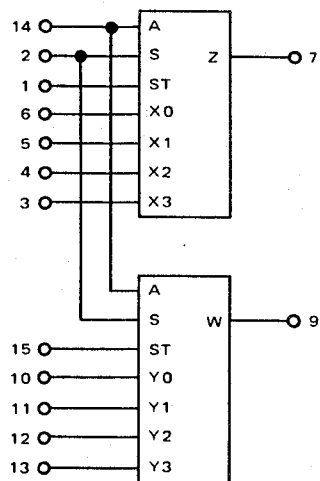
## MC14070BCP



## MC1458P/LM2903P/ $\mu$ PC1458



## MC14539BCP

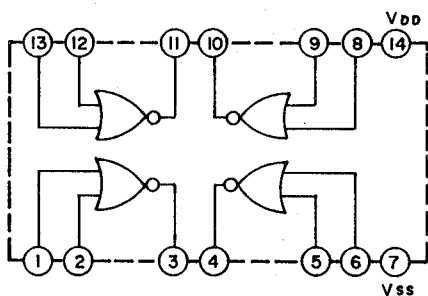


$V_{DD}$  = Pin16  
 $V_{SS}$  = Pin8

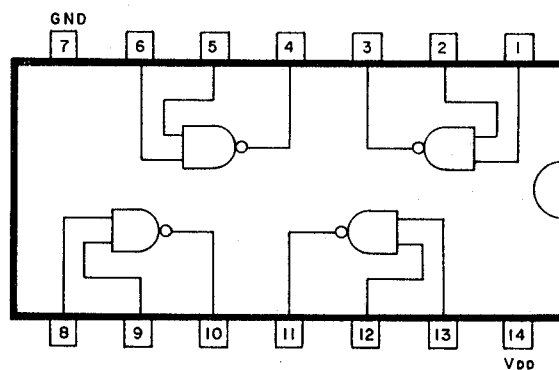
| ADDRESS INPUTS |   | DATA INPUTS |       |       |       | ST, ST | OUT PUTS Z, W |
|----------------|---|-------------|-------|-------|-------|--------|---------------|
|                |   | X3 Y3       | X2 Y2 | X1 Y1 | X0 Y0 |        |               |
| X              | X | X           | X     | X     | X     | 1      | 0             |
| 0              | 0 | X           | X     | X     | 0     | 0      | 0             |
| 0              | 0 | X           | X     | X     | 1     | 0      | 1             |
| 0              | 1 | X           | X     | 0     | X     | 0      | 0             |
| 0              | 1 | X           | X     | 1     | X     | 0      | 1             |
| 1              | 0 | X           | 0     | X     | X     | 0      | 0             |
| 1              | 0 | X           | 1     | X     | X     | 0      | 1             |
| 1              | 1 | 0           | X     | X     | X     | 0      | 0             |
| 1              | 1 | 1           | X     | X     | X     | 0      | 1             |

X = Don't Care

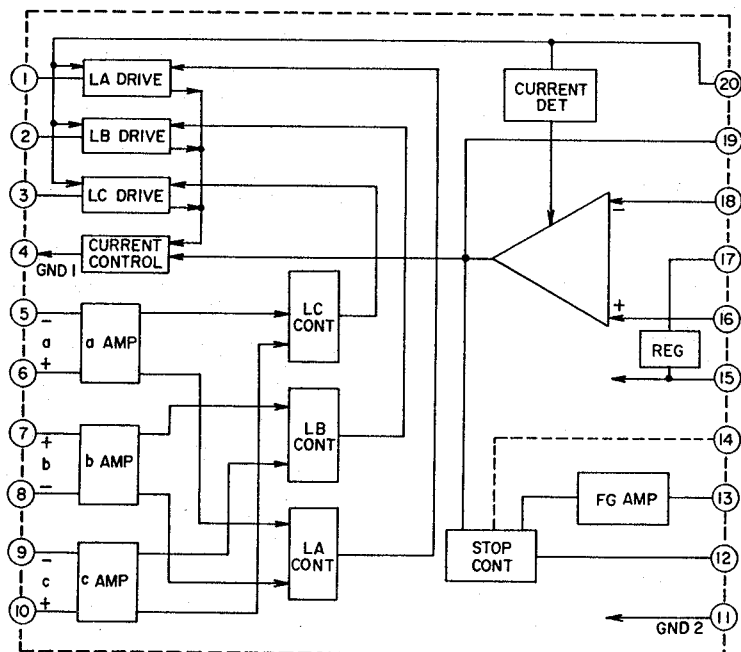
## TC4001BP



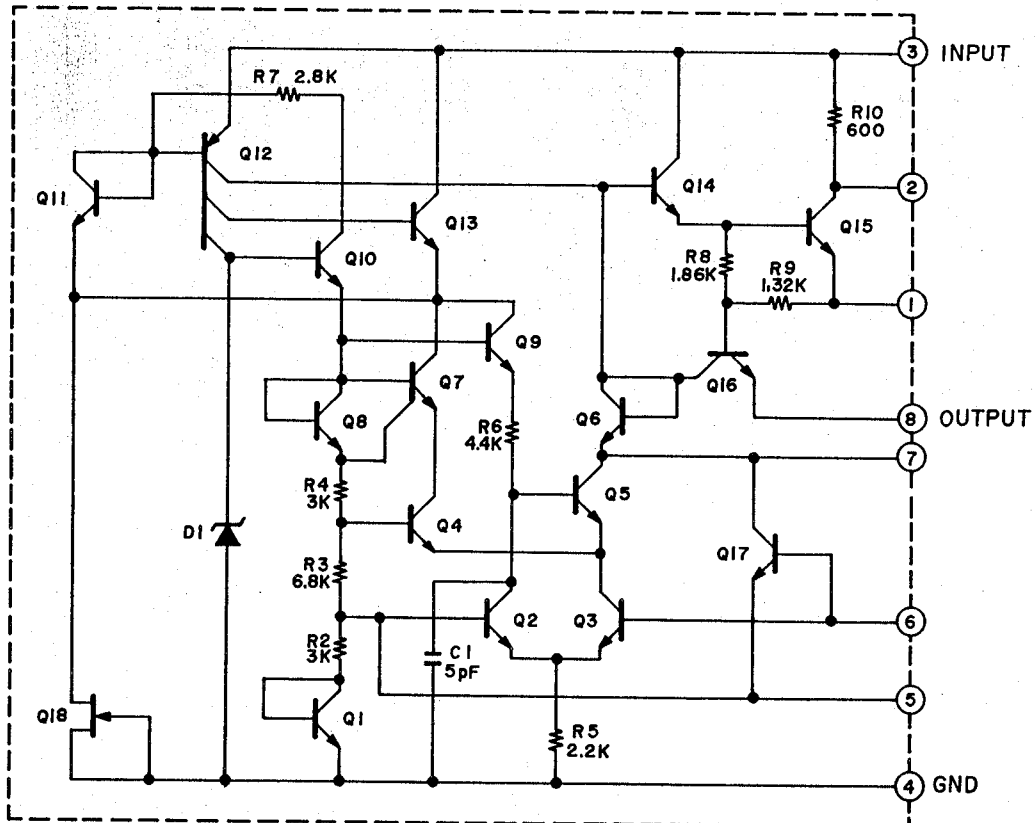
## TC4011BP



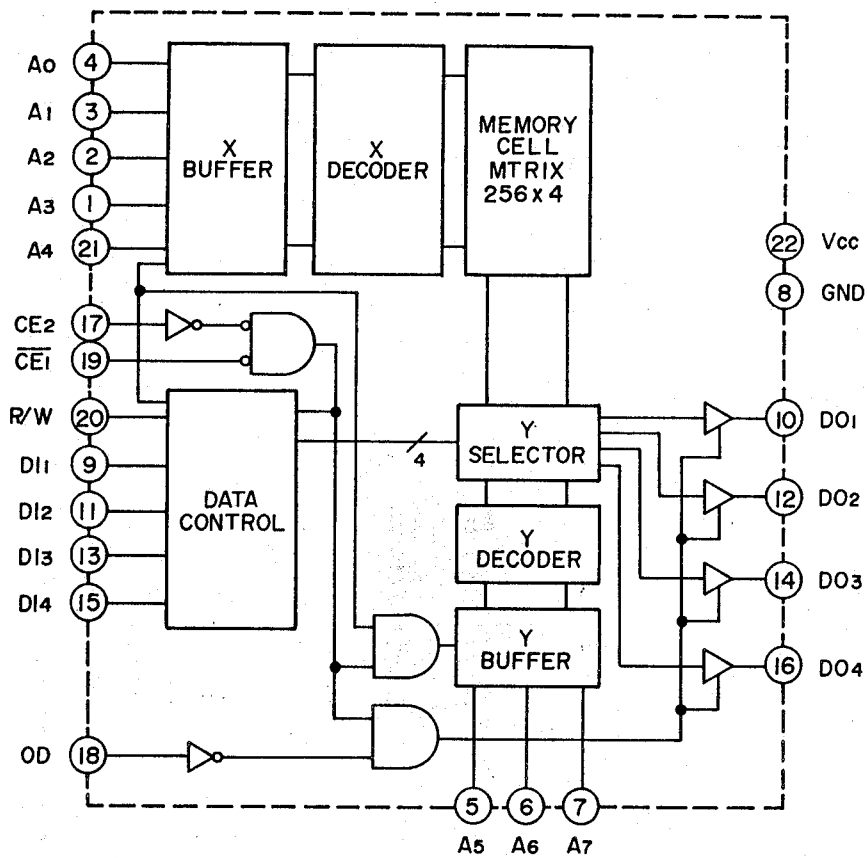
## TA7234



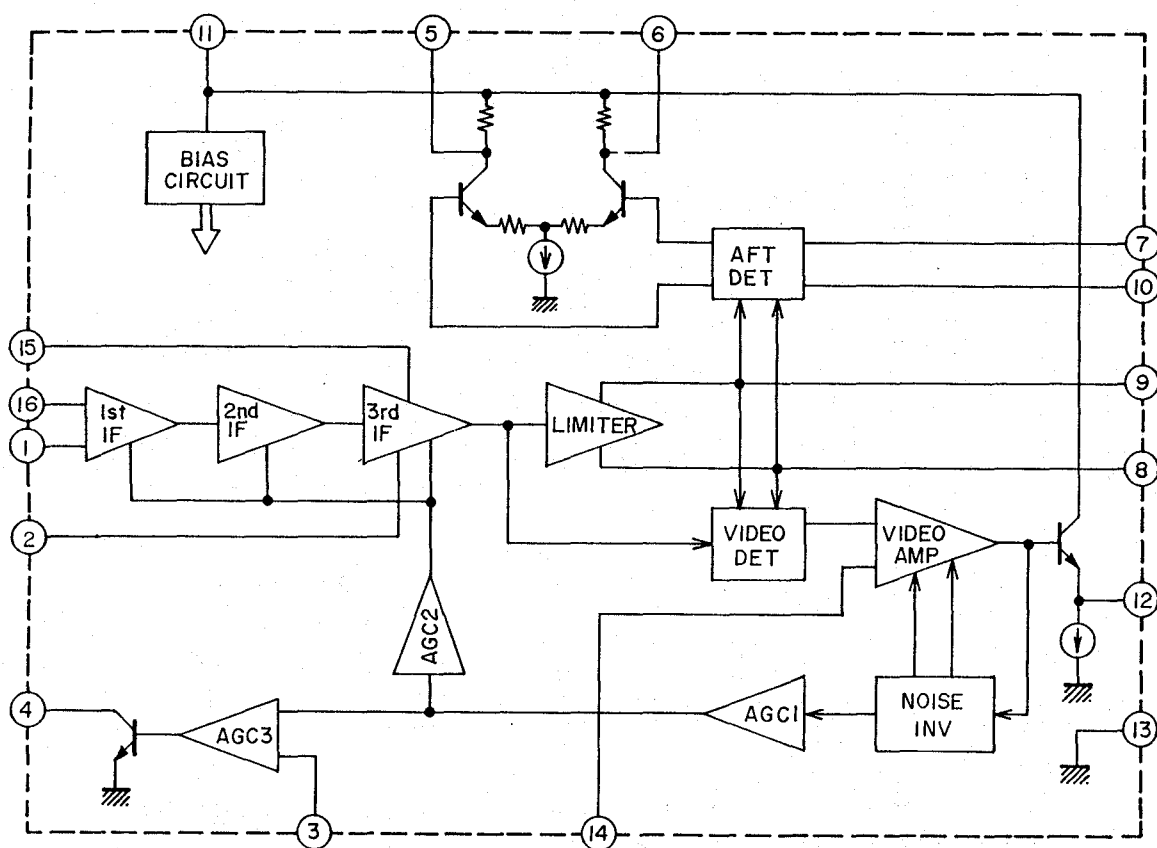
# μPC141C



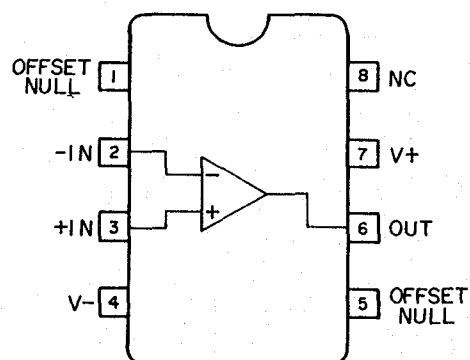
# μPD5101LC



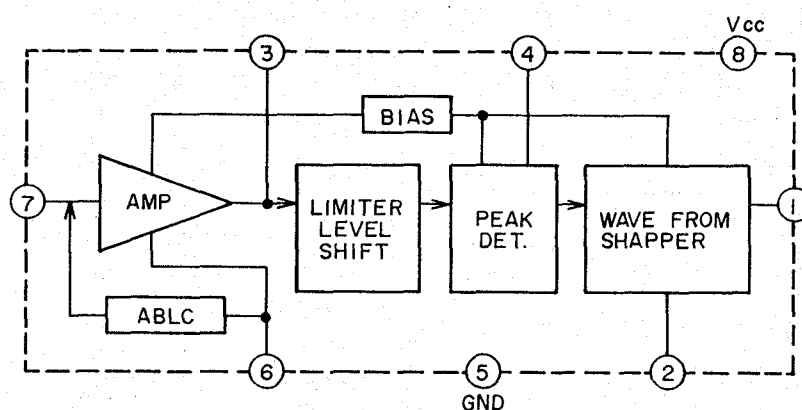
# TA7607P



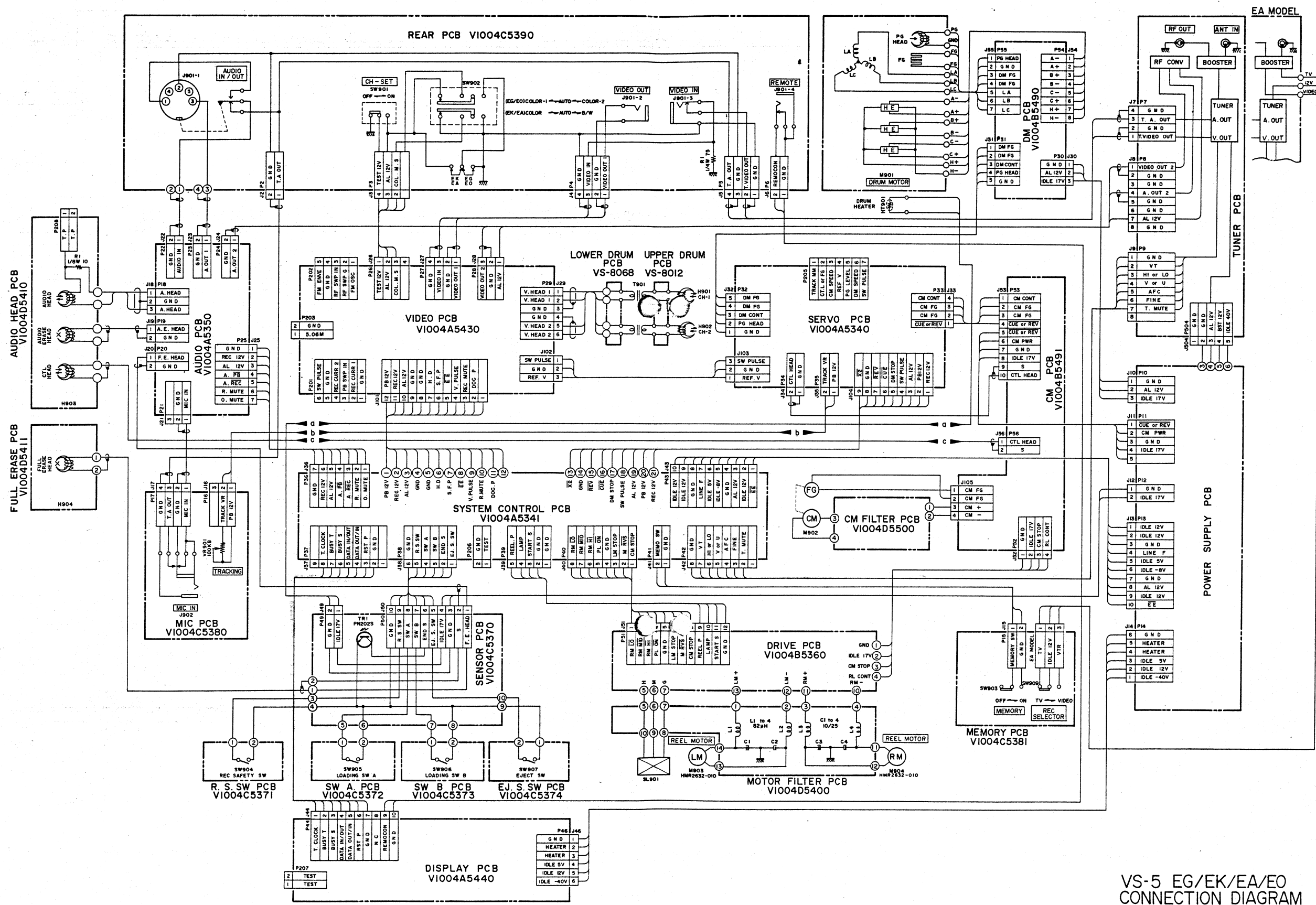
# μA741CP/TL082CP



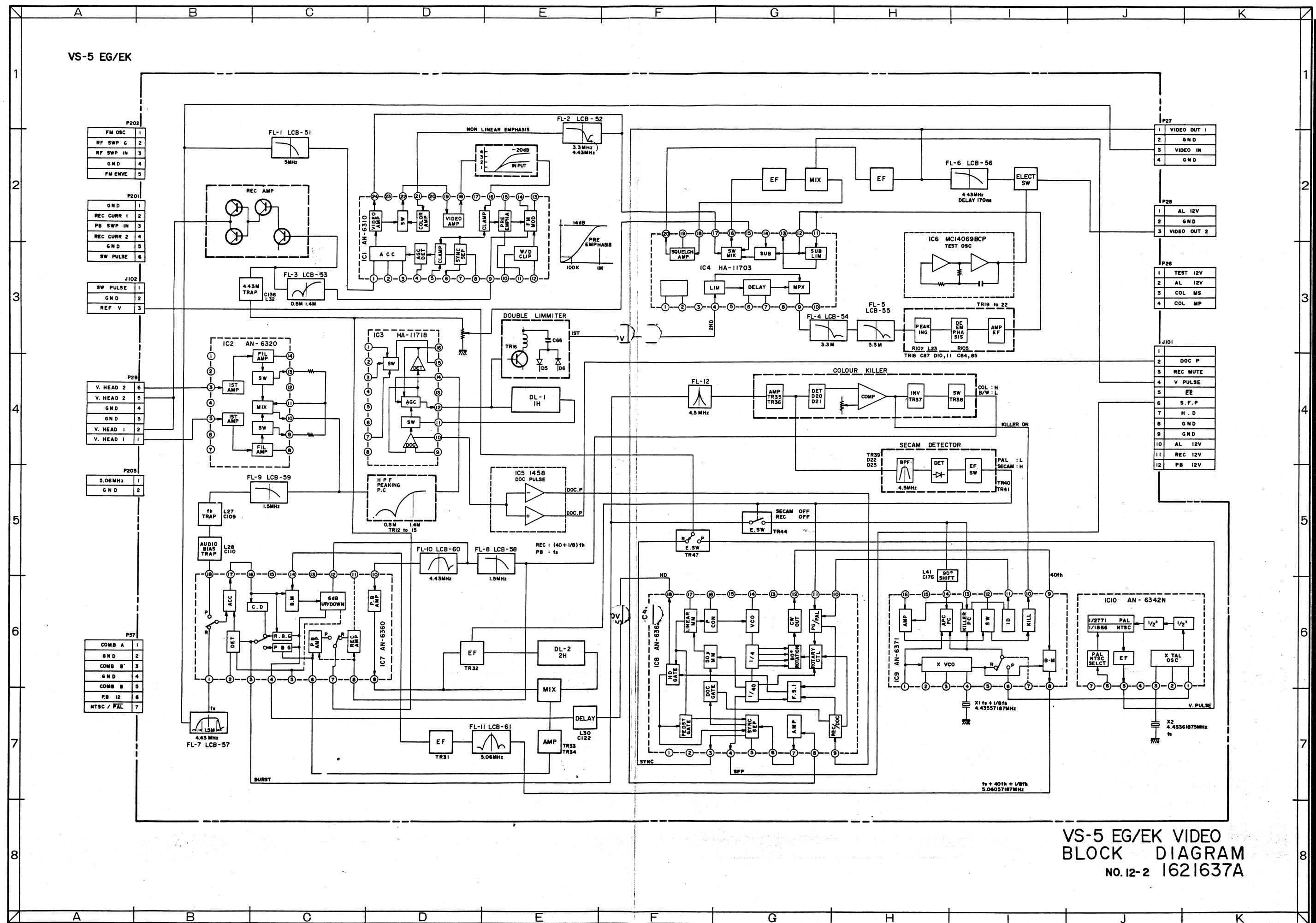
# μPC1373H



VS-5 EG/EK/EA/EO



VS-5 EG/EK/EA/EO  
CONNECTION DIAGRAM  
NO.12-1 1621636C





VS-5 EG/EK/EGN/EA/EO

VIDEO (PAL) PCB V1004A5420

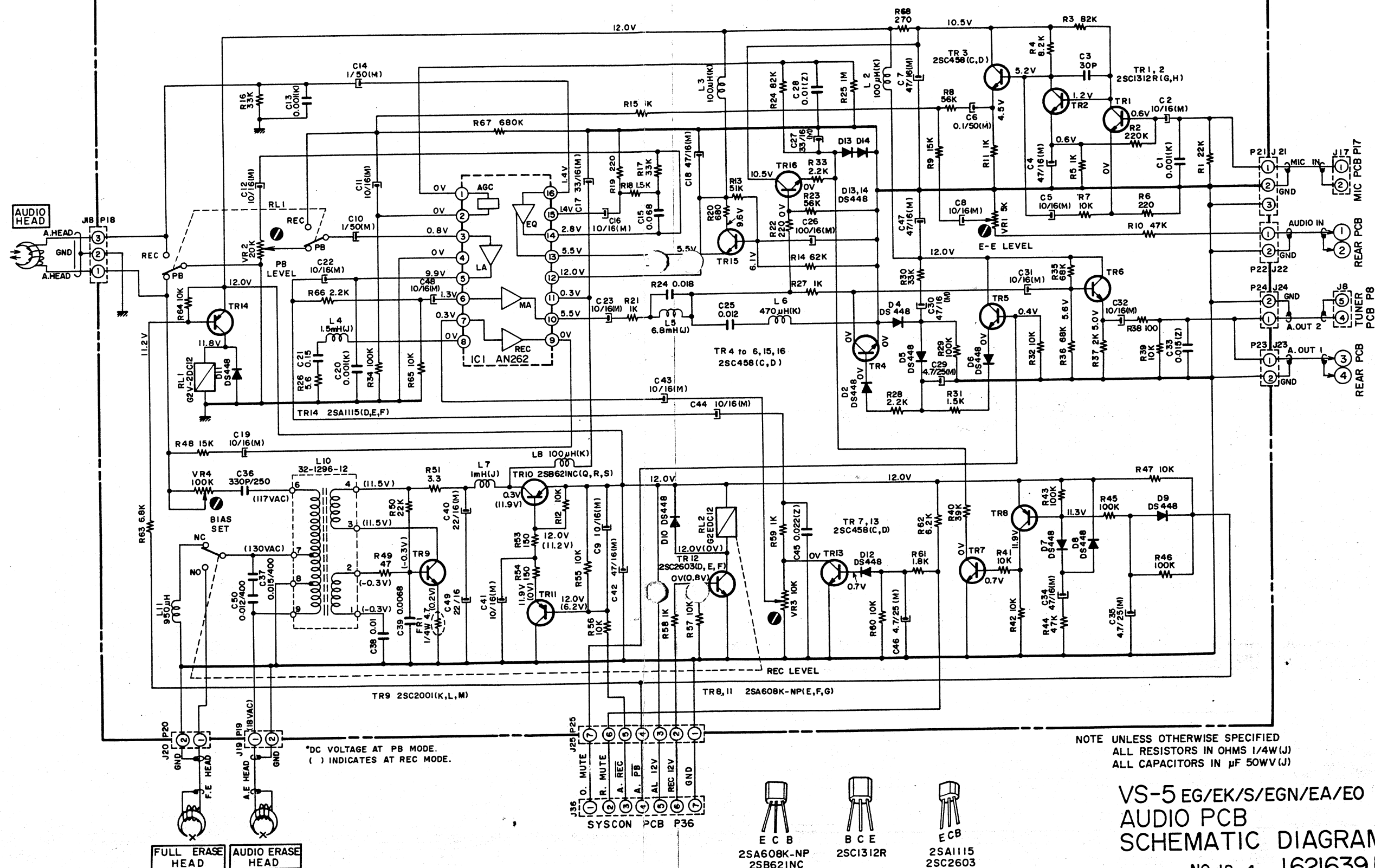
VS-5EG/EK/EGN/EA/EO  
VIDEO (PAL)  
SCHEMATIC DIAGRAM  
NO. 12-3 1621638B

NOTE  
UNLESS OTHERWISE SPECIFIED  
ALL RESISTORS IN OHMS (1/4W, 1/2W)  
ALL CAPACITORS IN  $\mu$ F (50 WV)  
NON-POLAR CAPACITOR

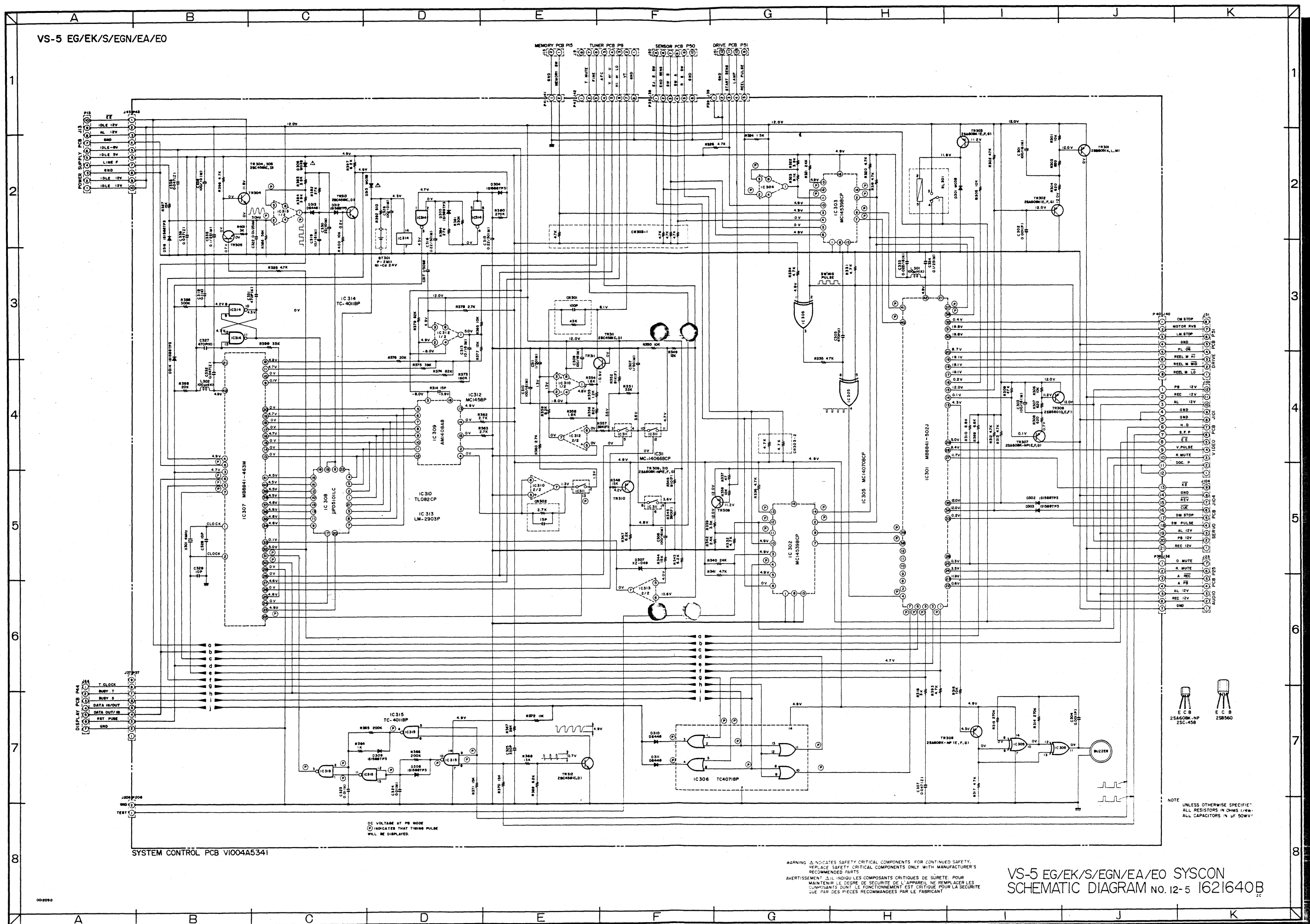
254608K-NP  
25C335NP  
25C2274K  
25B621NC  
25A1115  
25C2603

VS-5 EG/EK/S/EGN/EA/EO

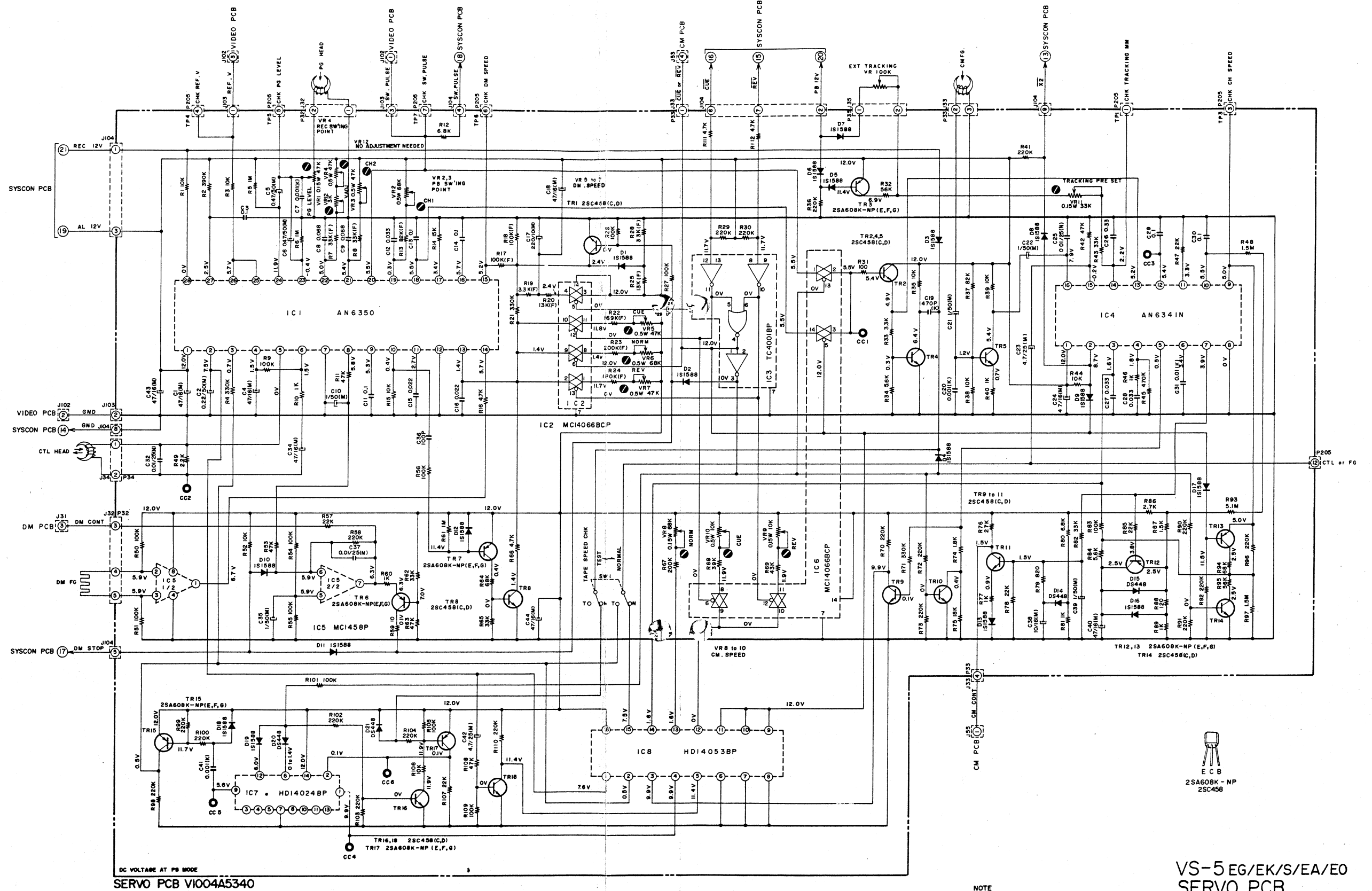
AUDIO PCB VI004B5350



001208F

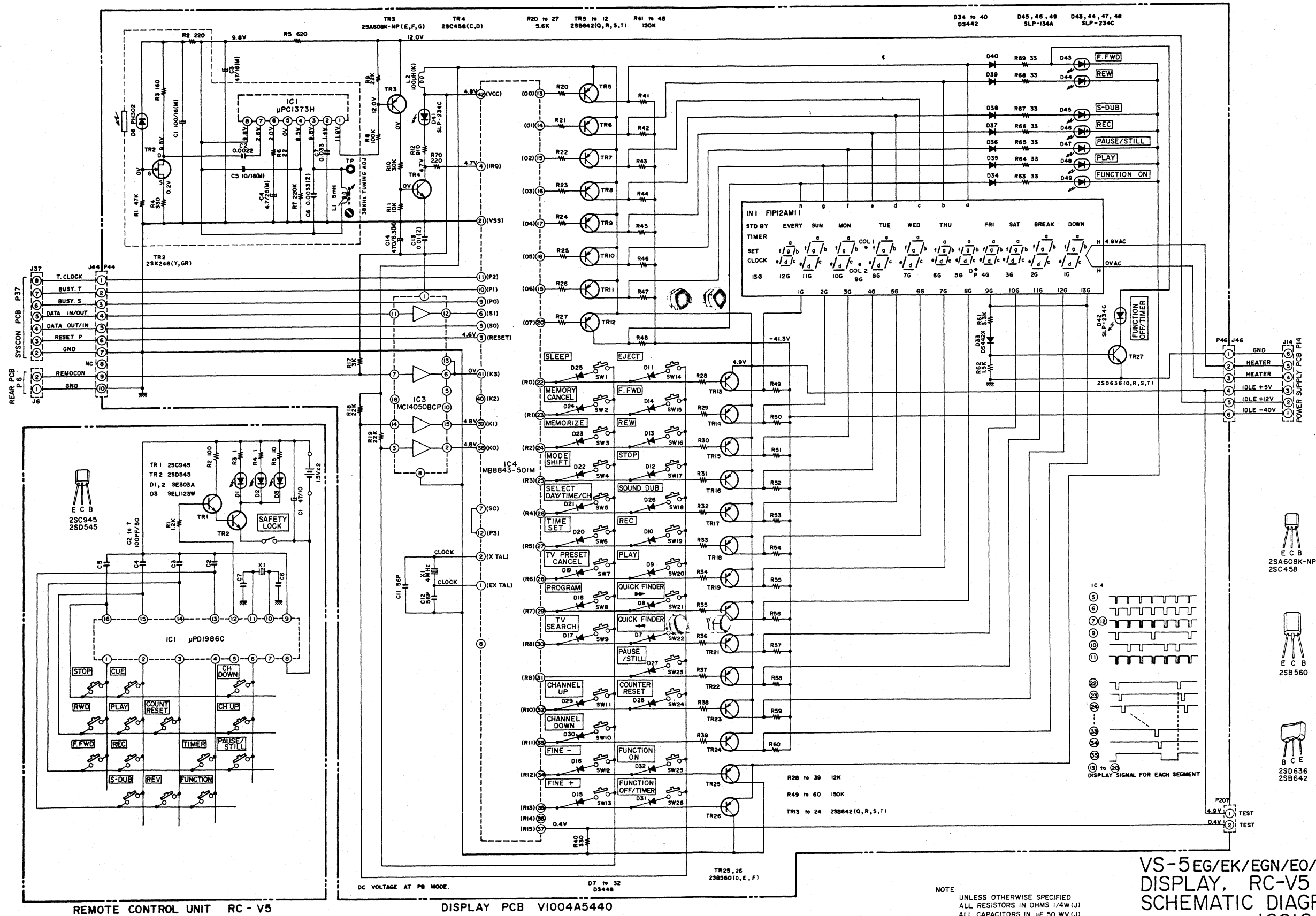


VS-5 EG/EK/S/EA/EO





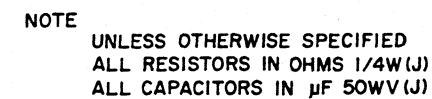
VS-5 EG/EK/EGN/EA/EO



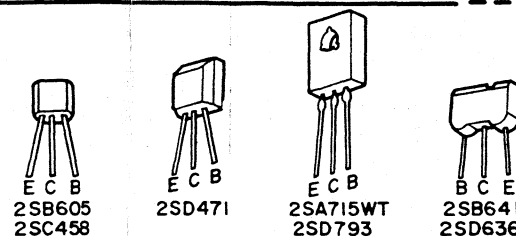
NOTE  
UNLESS OTHERWISE SPECIFIED  
ALL RESISTORS IN OHMS (1/4W (J))  
ALL CAPACITORS IN  $\mu$ F 50 WV (J)

VS-5 EG/EK/EGN/EA/EO  
DISPLAY, RC-V5  
SCHEMATIC DIAGRAM  
NO. 12-7 1621642B

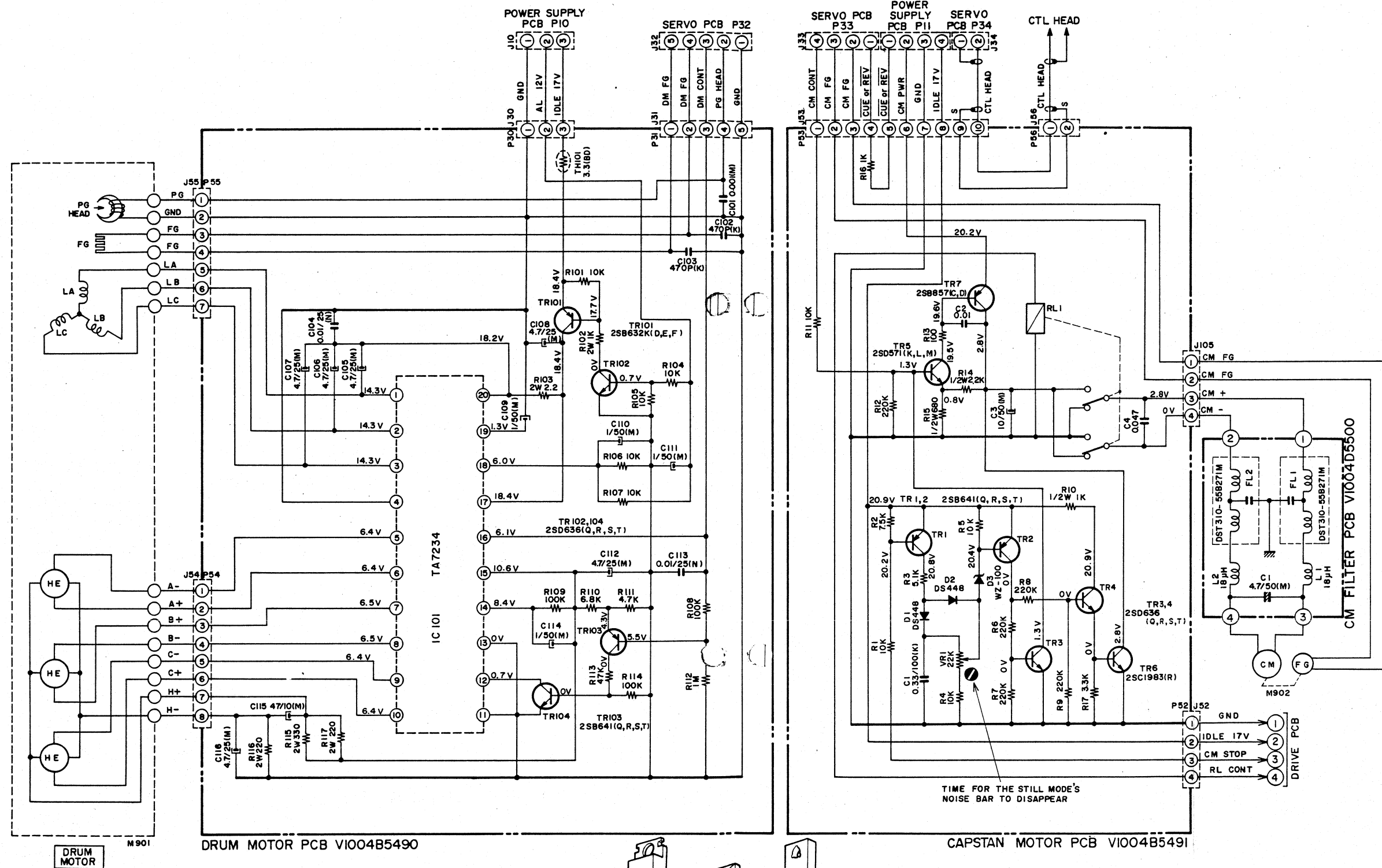
001212E



2

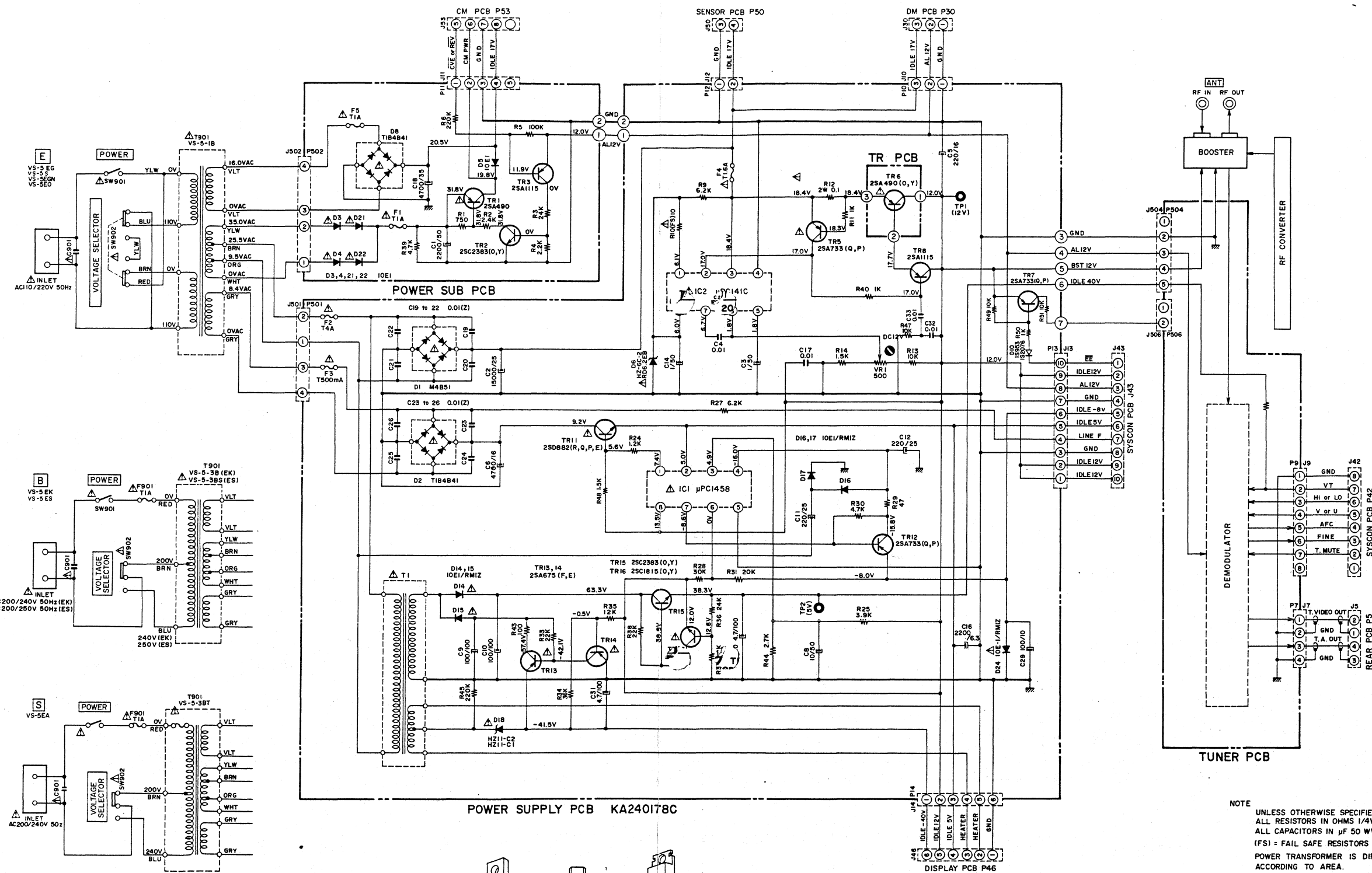


VS-5 EG/EK/S/EGN/EA/EO



VS-5 EG/EK/S/EGN/EA/EO  
DRUM/CAPSTAN MOTOR  
SCHEMATIC DIAGRAM  
NO.12-9 1621644B

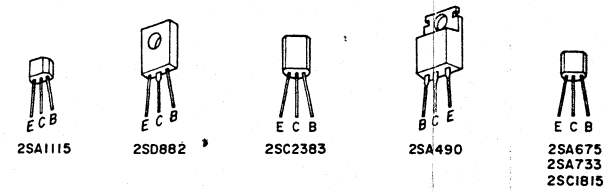
VS-5 EG/EK/S/EGN/EA/EO/ES



NOTE  
UNLESS OTHERWISE SPECIFIED  
ALL RESISTORS IN OHMS 1/4W (J)  
ALL CAPACITORS IN  $\mu$ F 50 WV (J)  
(FS) - FAIL SAFE RESISTORS  
POWER TRANSFORMER IS DIFFERENT  
ACCORDING TO AREA.

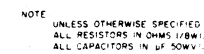
WARNING:  $\Delta$  INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY,  
REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S  
RECOMMENDED PARTS  
AVERTISSEMENT:  $\Delta$  IL INDIQUE LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR  
MAINTENIR LE DEGRÉ DE SÛRETÉ DE L'APPAREIL, NE REMPLACER LES  
COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SÛRETÉ  
QUE PAR DES PIÈCES RECOMMANDÉES PAR LE FABRICANT

VS-5 EG/EK/S/EGN/EA/EO/ES  
POWER SUPPLY  
SCHEMATIC DIAGRAM  
NO. 12-10 1621645C



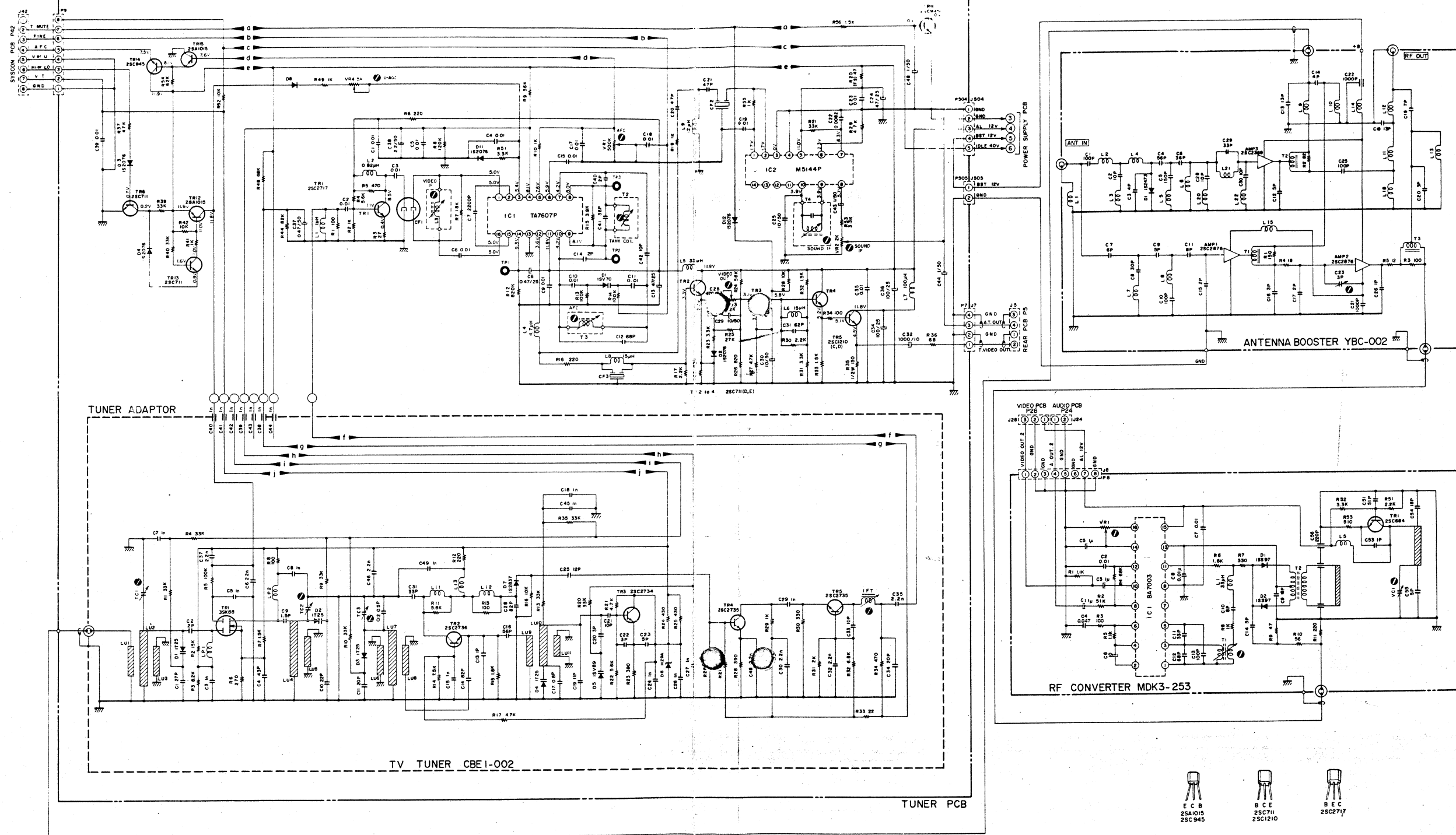
001215





VS-5 EG TUNER  
SCHEMATIC DIAGRAM  
No.12-11 1621646A<sub>26</sub>

VS-5 EK



NOTE  
UNLESS OTHERWISE SPECIFIED  
ALL RESISTORS IN OHMS (Ω/W/L)  
ALL CAPACITORS IN μF (SOW/L)

VS-5 EK TUNER  
SCHEMATIC DIAGRAM  
NO.12-12 1621647A